Training Women as Military Motorcyclists.

2d.

MOTOR CYCLING

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THE CLYNO ENGINEERING CO.,
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CLYNO

1301

Training Women Motorcyclists for the Army.

An Official School for Women Desirous of Entering a Military Corps as Solo or Sidecar Drivers.

"HOW can I learn to drive a motorcycle for the Army?" This is the question which is continually being asked by hundreds of women who have probably observed the lady D.R.s with their P. and M.'s in the streets and to whom this branch of military service has particularly appealed. Hitherto there has been no answer to the question and, consequently, hundreds of women have given up the idea or have applied their energies to some other form of service; a vast pity, for no work is so suited to feminine capabilities as that of motorcycle transport and despatch riding, and there are enormous numbers of fit men now performing this duty whose places could be taken by women, were the necessary training easily available.

These facts have at last been realized by the authorities and the Women's Legion have taken the matter in hand. The result is that a school at which women may be trained to drive both motorcycles and cars has been inaugurated in London by the Legion, so that there is now no need for any girl desirous of taking up this work to hang back, be she experienced or an absolute ignoramus in all things motoring, so long as she is keen and physically fit.

A lesson in tyre changing.

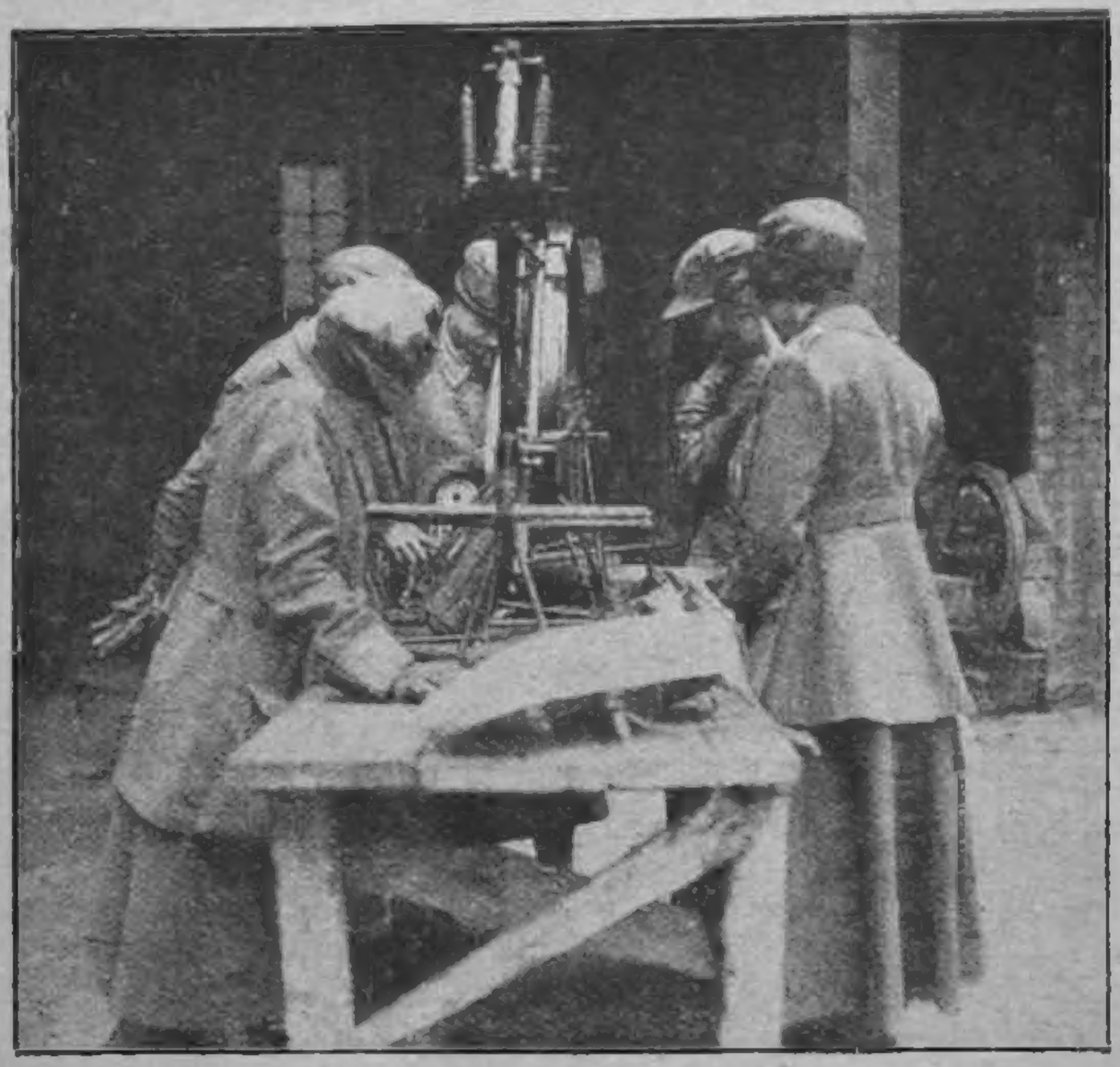
The first thing that must be realized by the intending pupil is that the authorities of the Legion have opened this school with the prime object of training women to take the places of male drivers in various military corps. They do not wish, therefore, to spend time and money over girls who are unlikely to do any credit to their training or who do not enter the school with the fixed idea of taking up Army work under the Legion when they have completed their course. In fact, women commencing tuition do so under agreement that they will take up military work where they are required to, if and when they are "passed out" as expert drivers by the school authorities. Furthermore, all learners must be prepared to take their course seriously: to give all their energies and time to the training. The course, which is one month in duration, cannot be extended for anyone, and it is necessary for recruits to work hard every minute of the allotted time if they wish to get passed out in the end as proficient. Of course, if any pupil finds that her health will not stand the work, she is allowed to cancel her agreement, but it must be understood that this is a school inaugurated for the benefit of the Army and not to provide cheap training for the woman who merely wants to learn to drive a motorcycle for her own pleasure.

The school is situated centrally in London, and applications to enter it should be made to the Headquarters, Women's Legion, 15, Pall Mall East, London, S.W. As time goes on and its activities are necessarily increased it will be extended and, it is hoped, will eventually become the training centre for all women recruits for motoring branches of

Training Women Motorcyclists (contd.).

the Army. In conjunction with the school itself there are hostels, controlled by the Legion authorities, in which the pupils are required to live. Thus recruits from all parts of the country may take up the training without the worry and difficulty of finding lodgings in which to reside during the completion of their course. Learners are paid 25s. weekly during their training, out of which 15s. weekly is deducted for board and lodging, etc. Army rations are allowed to the recruits.

A fairly strenuous day's work is expected of the pupils, who commence at 8.45 a.m. and do not knock off until six o'clock p.m., with intervals for luncheon and tea. The varied nature of the instruction, however, prevents any possibility of monotony or tedium, more especially as so much of it is practical. Lectures dealing with the theoretical side of the internal-combustion process, etc., are delivered upon three days in the week. Other parts of the training consist of workshop practice, the art of washing down and cleaning, and greasing and oiling processes; these last are gone through daily. An interesting feature of the tuition is that all pupils are taught to drive and understand both motorcycles (solo and sidecar) and cars, so that although they are "passed out" as motorcyclists they can, if they wish, take up car driving instead of motor cycling at the conclusion of the course. The pupils are taught to drive and comprehend the working of various makes of machines and cars. This training is, therefore, invaluable to them having in view the after-war period, as well as to enable them to obtain a good living now. The Women's Legion, by inaugurating this school, is not only assisting the Army and helping on the war, but is doing an invaluable anticipatory service to the nation. When commerce once more resumes its activities after peace is declared thousands of motor drivers will be required and, thanks to the women trained during the war by the Legion, these will not be wanting. A month's course at the school is a splendid post-war investment for any woman, and it is to be hoped that numbers will realize this and act accordingly.



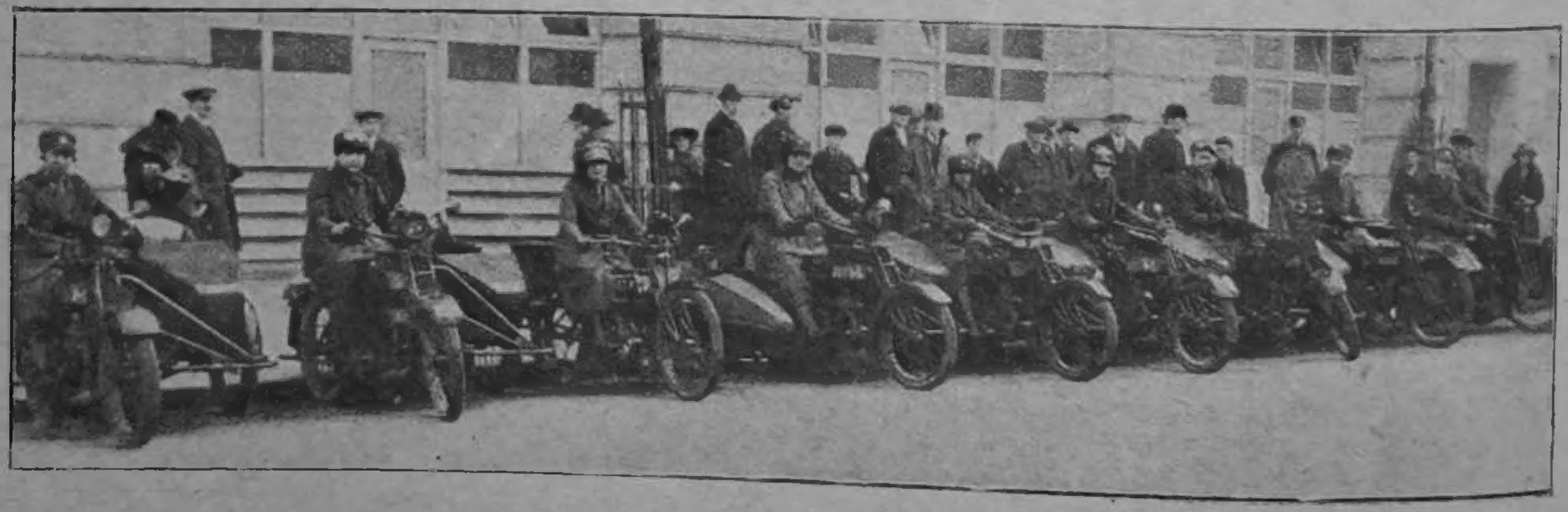
A dismantled 4 h.p. Douglas provides a lesson in engine detail.

Meanwhile, the field for women motorcyclists is extraordinarily large and substitution here can, in the opinion of the commandant of the Women's Legion, be carried out to a very great extent, with consequent advantageous results in our Overseas military personnel.

No actual age limit is placed upon entrance to the Legion's training school, but, naturally, the young woman of college or high school training, used to athletics and compulsory games would be the most likely to do credit to the course and to find her work easy and pleasant. Women between the ages of 18 and 35 are the most suited to life as Army motorcyclists. The work, though not likely to produce overstrain, is necessarily fairly strenuous and not suited for very young girls or elderly women unused to outdoor life. The healthy young women between 20 and 30, however, should find it exceedingly to her taste.

Vacancies for women motorcyclists, principally sidecar drivers, are at present existent in the Army Service Corps, the Australian Imperial Force and the Canadian Forestry Corps, but only a limited number of recruits is required for the two latter corps. No women motorcycle drivers are being recruited for the Royal Air Force.

It is to be hoped that a very great number of young women will take advantage of the tuition which the Women's Legion offers in this direction. Without doubt, in the past recruiting for this branch of service would have been doubled had the difficulty of initial training not deterred many who could not afford to attend a course at a motoring school.



The morning muster.

REVOLUTIONIZING MOTORCYCLE DESIGN.

An Earnest Endeavour to Remedy the Defects and Shortcomings of Modern Motorcycle Practice, Bringing it Up to the Level of the Best Car Production.

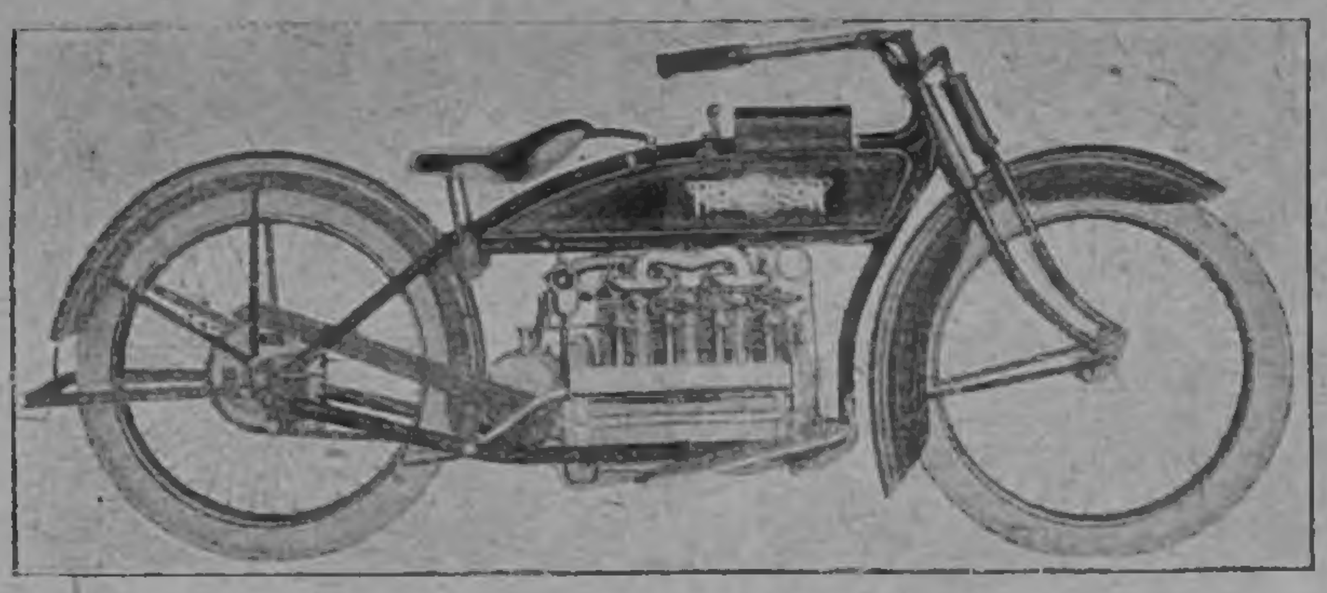
A series of critical articles by Mr. D. S. Heather, B.Sc., working in conjunction with a number of practical designers.

PART VII.

Further Consideration of the Power Unit.

HAVING discussed the questions of balance and torque, the next item that presents itself for consideration is that of acceleration. Now, leaving out for the moment the question of gear ratios, the acceleration obtainable is, broadly, proportional to the ratio between power available and weight to be moved. It must be remembered, however, that in addition to moving the whole machine with its load in a forward direction it is necessary to accelerate the revolving portions of the mechanism, and as these have a certain amount of inertia they must be taken into account. The chief revolving items are the road wheels and the flywheel, but as the road wheels are not affected by the type of engine used the latter need only be considered in this connection.

Assuming, therefore, equal power and equal weights of machines with the various types of engines, it is evident that, on this basis, the engine with the lightest flywheel will give the fiercest acceleration. It has already been shown that the four-cylinder engine requires a very much lighter flywheel than any of the other types, and it should therefore give the best results from this viewpoint. In addition, it must be admitted that the more even the turning moment the greater the acceleration which will be obtained, just as a steady push will start a heavy truck moving much more quickly than a series of hammer blows, even though the latter may be actually much more powerful. Theoretically, therefore, the four-cylinder engine should give much better acceleration than any of the other types of engines considered, and this is amply borne out in practice, as everyone who has ever ridden a four-cylinder will agree.



The four-cylinder Henderson, the successful American production represented in this country by Messrs. Robertsons, Ltd. This view shows the adaptability and accessibility of this type of engine.

Adaptability and Accessibility.

Adaptability is another matter. Here the single certainly scores, for it is possible to house it satisfactorily in almost any type of frame and it can be placed with its axis either parallel or at right-angles to the frame of the machine. The 55 degree twin is almost as good, but the 90-degree twin is a rather difficult proposition, for it usually calls for a special frame design owing to the awkward angle of the cylinders. Moreover, it is only possible to fit it with its crankshaft transverse, as in the conventional position, and it is thus not suited for use with shaft drive of any type. The horizontally-opposed twin, as has often been shown, is a difficult engine to house, and, in particular, it is difficult to arrange it so that its cylinders can be removed with the engine in situ. In the smaller sizes intended for purely solo use, it is possible to make a reasonable compromise if extreme care in design is used, and great attention is given to the question of accessibility, but in really large sizes it seems to the writer impossible to make a good job of it. The three and four-cylinder units can only be housed with their crankshafts parallel to the frame, so that either a shaft drive or a bevel or worm drive must be used to convey the drive to a cross-shaft. Apart from this fact, however, they are perfectly adaptable and can be housed in any reasonable frame design, as has been conclusively shown by the F.N. and Henderson. The four-cylinder engine, with careful design, can be made to take up no more room than a 55-degree twin of equal capacity, and it furthermore possesses the important merit of accessibility, for the cylinders can easily be removed and the auxiliary units, such as the carburetter and magneto, can be placed in easily get-at-able positions.

The Large Cooling Surface of the Four-cylinder.

For successful air cooling, it is a scientific fact that the smaller the cylinders the better the cooling will be. This is due to the fact that, as the cylinder becomes larger, the ratio of cylinder wall to combustion space volume becomes smaller, and, consequently, there is less chance for the heat to be conducted away. From the following table it will be seen that the four-cylinder has 58 per cent. greater wall area than the single of equal capacity, all the engines considered being of such dimensions as to give 500 c.c. capacity.

	Single 85 by 88	Twin 67 by 70	Three 59 by 61	Four 52·5 by 57
Total wall area swept by piston in square inches	236	295	339	376
Total area of head in square inches	56.5	70·5	82	86·5
Total wall area (head and piston swept) square inches	292·5	365 5	421	462·5
Relative areas, taking single as unity	1	1·248	1 44	1·58
Relative areas, taking four as unity	·692	·79	·91	1

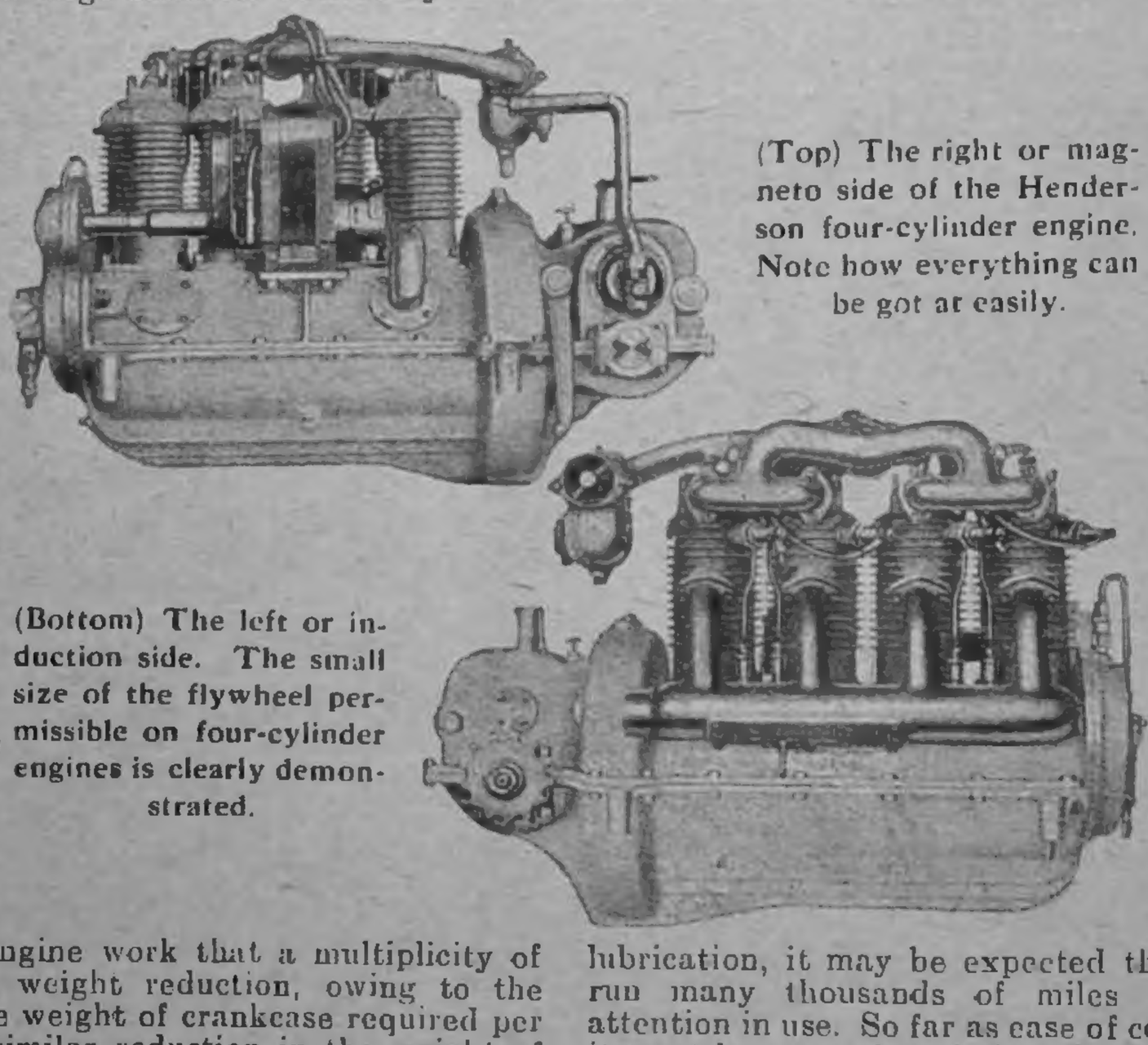
There may be some difficulty in arranging for equal cooling of all cylinders on the four, but there is no reason to doubt that this trouble can be overcome if advantage is taken of the lessons which have been learnt in aero practice during the past three years. The trouble is more evident with the opposed twin, particularly in the large sizes, and this is, perhaps,

one reason why engines of this type over 500 c.c. capacity have not in the past been so successful as the smaller sizes. It seems likely, therefore, that the four will prove the best proposition from the cooling point of view.

The Consideration of Weight.

Any discussion of the weight question must be largely theoretical, as so much will depend upon the design of the particular engine concerned, but it is nevertheless possible to come to certain broad conclusions as to what may be expected, given reasonable design on each type. Now, the heaviest item of any ordinary motorcycle engine is the flywheel (or flywheels, if they be of the internal type), and it is evident that the engine with the most even turning moment will require the lightest flywheel. As a matter of fact, the 500 c.c. F.N. flywheel weighed 10 lb. complete with clutch, against 35 lb. for the pair employed in the ordinary single, and, say, 30 lb. for the average V-twin. The horizontally-opposed twin is somewhat lighter, not so much because it has a rather more even turning moment, but because it is usually fitted with a large-diameter outside flywheel.

The writer feels quite justified in stating that a 1000 c.c. four-cylinder would be satisfactory with a flywheel at least 20 lb. lighter than that required for any of the twins of equal capacity. The four thus has an advantage of 20 lb. on one item alone. The F.N. crankcase in cast-iron weighed 17 lb., but had aluminium been used this would easily have been reduced to 11 lb., against the 15 lb. or so for the single or twin. This is not surprising, for it has long been recognized in aero engine work that a multiplicity of cylinders leads to weight reduction, owing to the cutting down of the weight of crankcase required per cylinder, and the similar reduction in the weight of the rotating parts. It would be easy to give other figures, but one more example will suffice. The F.N. cylinders weigh 3 lb. each, giving a total of 12 lb. for the four, whereas the cylinder from a 1917 single of only 60 c.c. greater capacity weighs 13 lb. The complete F.N. engine with aluminium crankcase would weigh 66 lb., whereas the modern single-cylinder would weigh about 90 lb. at the very least, and a very light 6 h.p. twin about 95 lb.



(Top) The right or magneto side of the Henderson four-cylinder engine. Note how everything can be got at easily.

(Bottom) The left or induction side. The small size of the flywheel permissible on four-cylinder engines is clearly demonstrated.

Again the Four-cylinder is Superior.

Taking all these considerations into account, the writer is of opinion that it is possible to design a four-cylinder power unit with a lower weight per horse-power than any of the other types considered. It can certainly beat the single and the V-twins on this score, and there seem no grounds for thinking that the horizontally-opposed twin has any material advantage over the latter.

This leaves the following four points for consideration, viz., cost of manufacture, running cost, attention required in use and ease of control. It is indisputable that the single-cylinder engine can be manufactured more cheaply than any other type, but its other disadvantages far outweigh this point. It is doubtful whether there is necessarily much difference in manufacturing cost between the V-twin, the horizontally-opposed twin and the four for in the latter certain machining operations can be considerably simplified if a reasonably large output is aimed at. However, it must be admitted that it is likely to be slightly more expensive than the other types. It should, nevertheless, make up for this in running cost. By this it is not meant to infer that it will necessarily have a lower petrol consumption, but it should certainly be economical in oil, provided that a proper lubrication system is incorporated, such as that which has already been described.

The Four-cylinder Costs Least to Maintain.

The great point, however, is that its maintenance cost over a large mileage would be very considerably less than that of the other types, for it is possible to design a four on sound mechanical principles which cannot well be incorporated in the conventional types. Crankshaft and big-end bearings of ample size can be used, as there is no restriction of space, and a thoroughly sound timing gear can be incorporated. Moreover, owing to the reduced size of the cylinders, the explosion and inertia stresses are very considerably reduced as compared with a single or twin, so that, in conjunction with correct lubrication, it may be expected that the four would run many thousands of miles without need for attention in use. So far as ease of control is concerned, it must be remembered that the four-cylinder engine can quite conveniently be run with fixed ignition, and it can more readily be fitted with an automatic single lever carburetter than any other engine whatsoever. More will be said on this subject later when the question of carburation is considered. One more point only need be mentioned on the question of easy starting. Owing to the small size of the cylinders, the four-cylinder engine can easily be spun round without the necessity for using an exhaust lifter, and as one or other of its pistons is always on the compression stroke, one quarter of a revolution is sufficient to start it when warm, and it will tick over quietly in neutral.

There are doubtless many other points which might be raised, but the main considerations have been dealt with. To sum up, the 90-degree twin, the horizontally-opposed twin and the four vie with each other

Revolutionizing Motorcycle Design (contd.).

for perfect balance. On the ground of torque, the four has an immense advantage, followed at a respectful distance by the horizontally-opposed twin. The four will give the fiercest and smoothest acceleration, but in common with the horizontally-opposed twin and the 90-degree V-twin it has certain disadvantages as regards adaptability. The best type for air cooling is the four, which is also the lightest, but it will cost somewhat more to manufacture. On this latter point the single scores its sole good mark, but the four is again pre-eminent as regards running cost, attention required in use, and ease of control.

All things considered, therefore, the four-cylinder engine is undoubtedly the most desirable type for use in the post-war two-wheeled automobile. In small sizes, however, it tends to become rather fragile in certain parts, such as the pistons, if they are to be designed in reasonable proportion. In the writer's opinion, therefore, the four-cylinder is the ideal type for machines intended for passenger work which require an engine of 750 c.c. or over. For smaller sizes it appears doubtful whether the 90 degree or the horizontally-opposed twin will prove superior, since their merits are fairly well matched; the odds appear to be on the horizontally-opposed twin owing to its more even torque. The machine we are considering, however, must be capable of passenger work anywhere, so that the four-cylinder engine of about 1000 c.c., with pump and trough lubrication, air-cooled by means of aero-engine type cowling, should undoubtedly be adopted.

(To be continued.)

PROPAGANDA BY MOTORCYCLE.

A Patriotic Suggestion, But Would the P.C.D. Grant Permits?

IN spite of the petrol restrictions, there is a sphere of activity for motorists which may prove to have a large share in the successful conduct of the war. I refer to the efficient distribution of the highly important and necessary propaganda conducted by the War Aims Committee. Unfortunately at present this literature does not tend to pierce beyond the larger towns or such districts as possess a railway bookstall. Motorists could greatly assist to carry out the Government's intention of an even distribution of war publications by organizing a system of distribution in the rural districts.

The scheme here outlined can be accommodated or enlarged according to circumstances, but I suggest the following plan as the framework of the organization:

The country should be divided up into districts corresponding to the areas embraced by each General Post Office, and to each of these districts a distributer appointed. Each distributer could then subdivide his district into about five sub-districts with a sub-distributer to each of these. The modus operandi would then be somewhat analogous to the postal service. The War Aims publications would be parcelled out to the distributers in each district, either by train or post. Upon receipt of these, the distributer would share his parcel among the sub-distributers for his particular sub-district. The sub-distributer would visit each village or hamlet for the actual distribution. It would be impossible to effect a universal distribution, and the best compromise would be to visit, say, about 30 of the principal houses in each village of over 2000 inhabitants, and so on, in proportion, one publication being left for about 60 to 70 people. The labour of delivery would be halved by using a sidecar outfit with a passenger. Once the system could be got into working order, distribution could be further assisted by the elder and more responsible of the Boy Scouts, who doubtless would be delighted with the task.

It would hardly be necessary to visit towns with a population about 15,000 or places where Smith's bookstalls are established, but it would be preferable to confine the work to the middle and working classes of the rural districts.

Doubtless the suggestion of such a scheme in the columns of MOTOR CYCLING would bring many voluntary offers of help from would-be distributers. The War Aims Committee make no charge for the vast majority of their publications, which they are anxious to spread broadcast. It would entail only one day's work per week (and perhaps less) when the scheme becomes in working order, and finally our motoring sisters and youths between 16 and 18 could find an outlet for their patriotic energy to the advantage of the nation, themselves and their idle engines.

I offer this brief outline in the hope that the suggestion may bear fruit in the near future, and may be the means, of helping to hasten the conclusion of this protracted and crimson cataclysm.

H.J.P.

A9

A R.A.F. officer finds his sidecar cushion makes a useful jack for his sidecar wheel.

DISTINCTLY CONCERNING MOTORCYCLISTS

Personal Pars on Well-known Riders.

Lieut. Douglas Straight.

THE latest to whom I have to offer my congratulations is Lieut. Douglas Straight, who has just obtained his pilot's ticket in the R.A.F. Douglas is the worthy son of a popular father—and who does not know "Freddie" Straight, late of A.-C.U. and Rover fame? The new pilot joined early and served over 12 months in France attached to the London Rifle Brigade. The open road always had a strong fascination for Douglas, and he has put up some good stunts both as a motorcyclist and a cyclist. He was a most popular member of the Stanley Cycling Club and was the captain of the Junior Section for some time. A star performance was when he won that club's 25-mile unpaced championship in the remarkably good time of 1 hr. 15 mins. He certainly bids fair to follow in his father's footsteps.

* * *

MANY of my readers will be sorry to hear of the illness of that successful Birmingham agent, Mr. P. J. Evans, who has been suffering for some time past, and has now gone up to the North of Scotland to recuperate. I wish him a very speedy recovery. If memory serves me rightly, P.J. was the first winner of the Junior T.T., and his mount was at the time one of the fastest little twins which ever left the Humber works. Within two months of the T.T., Sam. Wright, on a sister machine, captured the hour lightweight record at Brooklands, assisted by the T.T. winner.

* * *

THE other day I ran across G. H. Hollis, the well-known member of the North-west London M.C., who informs me that he is now engaged on important work at the Admiralty. Hollis was a frequent supporter of the amateur clubs' events, and was generally astride a 2¾ h.p. Douglas, of which he speaks most highly.

* * *

ANOTHER of the old trial competitors I recently met was Sid Savage, of Triumph and Indian fame and a member of the M.C.C. and the Luton and South Bedfordshire M.C. Savage joined up in the R.E. during early 1914, but unfortunately could not stand the strain of the hard training and was consequently discharged from the Army. He is now on munitions, and, as he remarked to me, if he cannot fight the Boches he can make the stuff for the boys to use.

A10

Lieut. C. S. Burney.

WAS glad to get a few lines from Lieut. C. S. Burney, who corrects an inaccuracy in my recent note. He writes from France, where he is still with his repair depot—an R.E. shop where they tune electric lighting sets. He says he is likely to remain there for the duration, but this is not pessimism on his part, as he continues that he would think twice about a berth in England!

* * *

HAVE been closely in touch of late with E. L. Ford, a former member of the art staff of Temple Press Ltd., and whose striking illustrations are a feature of the latest technical work on aviation—"Practical Flying"—just being published from these offices. Ford was always a most enthusiastic motorcyclist, and in this capacity joined the R.N.A.S. in the early days of the war. The greater thrills provided by aviation proved a strong magnet and he speedily found his way to Hendon, where he secured his wings. From Hendon he passed through Yarmouth, Eastbourne and Dover in turn, having his first smash at the latter place. Later he crossed the Channel, but

Captain E. L. Ford

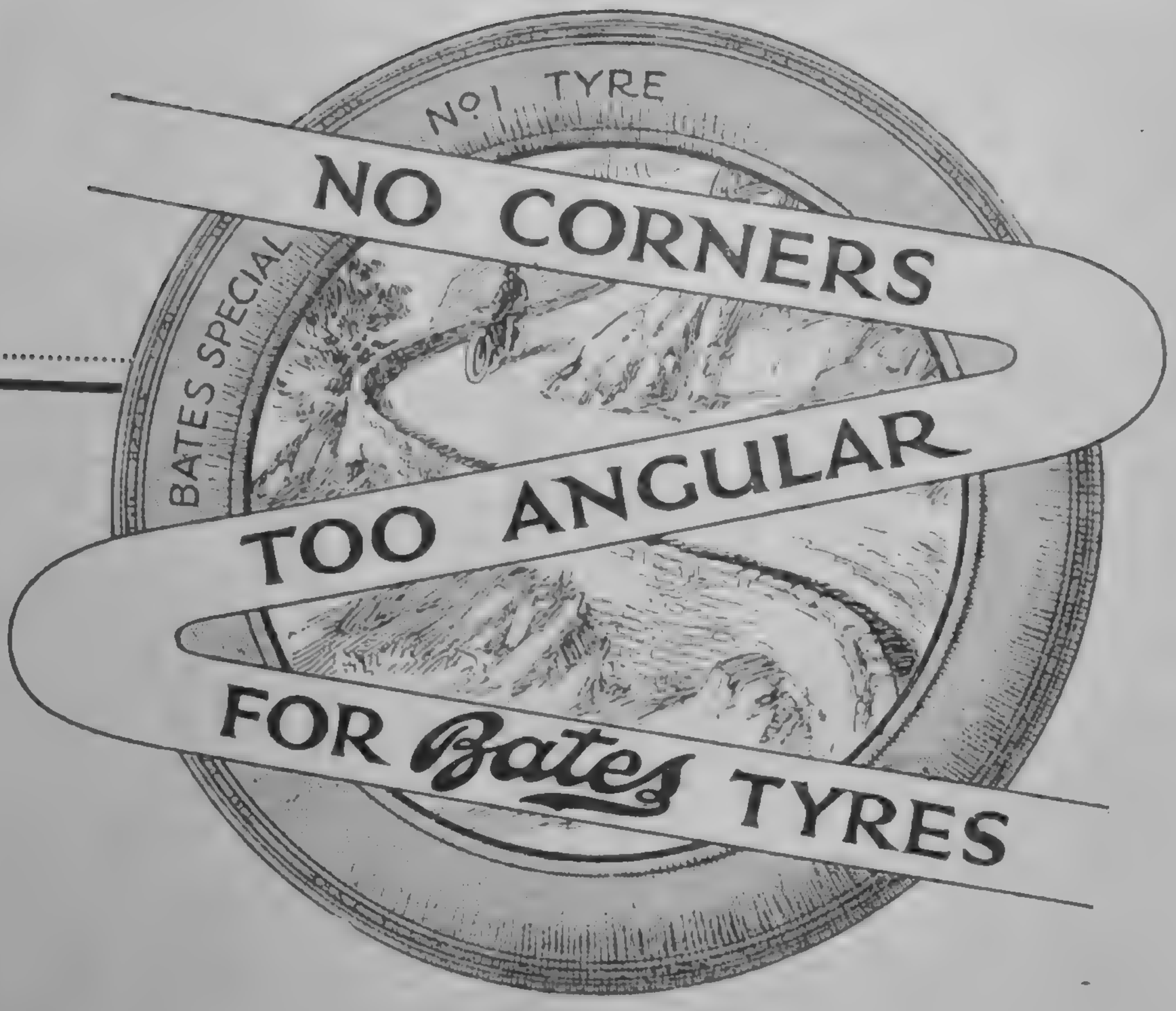
Lieut. Owen Tudor-Hart.

was the victim of an unfortunate accident while flying at Dunkirk aerodrome, "crashing" and injuring his head. After recovering he was ordered further afield and saw some nine months in the Grecian Archipelago. He has recently been gazetted to a captaincy in the R.A.F.

* * *

AMONGST the latest batch of prisoners to be interned in Holland is Lieut. Owen Tudor-Hart, who will be best remembered as being in partnership with our old friend Robertson Brown, actively engaged in demonstrating the merits of the Henderson in this country. His military career is of singular brilliance. When the first call to arms came he joined the Inns of Court O.T.C., and November, 1914, found him a Second Lieutenant in the Northumberland Fusiliers. Thirteen months later, having obtained his full lieutenancy in the meantime, he was transferred to the R.F.C., and was soon over the other side of the Channel. Here he showed extraordinary skill and courage and, acting as observer to Captain Summers, was awarded the Military Cross for a stirring feat of bravery. The official award reads: "... Attacked a flight of ten enemy aeroplanes, completely breaking up their formation. They were quite unsupported, but only broke off the engagement when all their ammunition was expended many miles over the enemy's lines. Their machine was under constant heavy fire from as many as four hostile machines at once, and was badly damaged." Within a very short time he was once again conspicuous for a feat of courage and initiative which makes thrilling reading. On this occasion his pilot was instantaneously killed during an encounter with eight enemy planes. The machine was not fitted with dual control, and Tudor-Hart put up a desperate resistance for over a quarter of an hour, manœuvring the plane and manning his machine gun as best he could. Finding escape by other means impossible, he decided to come down, but crashed at such speed as to render his machine entirely useless to the Huns. He escaped with fairly light injuries, and after sampling a German hospital camp was imprisoned in turn in Gutersloh, Crefeld, Schwarmstedt, Holzminden, and Heidelberg. He must find the hospitality of our Dutch friends a pleasant change. Here's wishing him a speedy sight of Great Portland Street again!

THE A.T.M.



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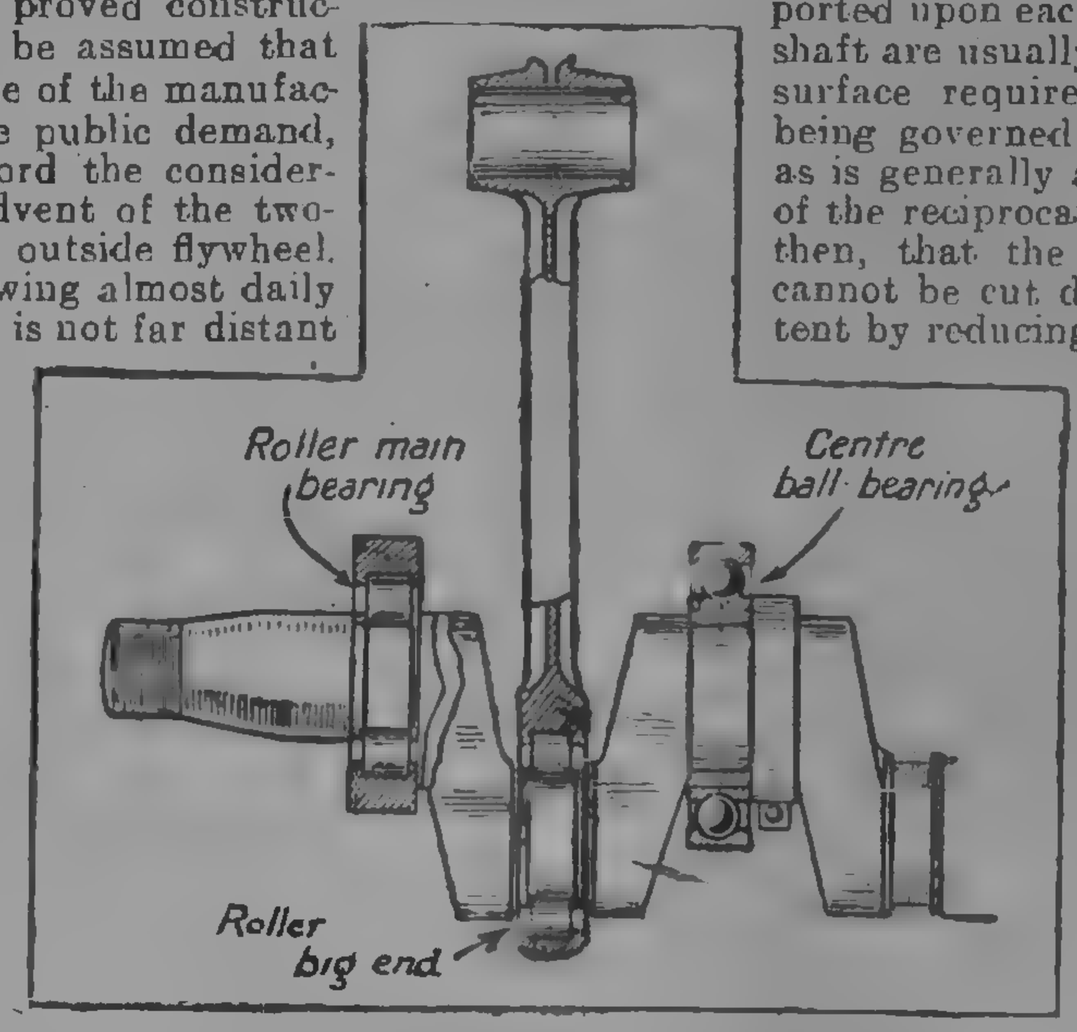
NEW ZEALAND—Cycle and Motor Supplies, Ltd., Farish Street, Wellington, and at Christchurch. **INDIA**—Skippers & Co., Ltd., 86-1, Clive Street, Calcutta, and at Bombay and Cawnpore; Chettle Holt & Co., Ltd., 9-10, Second Line Beach, Madras. **BURMA**—Watson & Son, 59, Phayre Street, Rangoon. **F.M.S. & S.S.**—A. C. Davis, Penang.

CROSS-COUNTRY COMMENTS

Solid Versus Built-up Crankshafts—The Necessity for Perfect Balance—An Ideal Type of Shaft.

FROM the earliest era it has been customary in motorcycle engine designing to employ crankshafts of the built-up type, in the construction of which the journals are generally attached to the flywheel by rivets or tapers and nuts, and the crankpin in a similar manner is supported by the solid webs of the flywheels. Apart from the questionable gain in appearance, there is little to commend the practice of enclosing the flywheels, and it is remarkable, considering that the solid crankshaft with outside flywheel is recognized as being mechanically correct and a sound engineering job, that the latter has not attained greater popularity. In this matter it is difficult to say whether the public or the designer is to blame, for on one hand it cannot but be admitted that the layman has been considerably prejudiced against the outside flywheel for years, and on the other—well, one could hardly accuse the producer of being ignorant of the advantages to be gained by adopting a practical and proved construction. It must, therefore, be assumed that this is just another instance of the manufacturer's desire to meet the public demand, but it is consoling to record the considerable fillip given by the advent of the two-stroke to the cause of the outside flywheel. That its popularity is growing almost daily is undeniable, and the day is not far distant when the outside flywheel and solid crankshaft will be the rule rather than the exception. In engines of the four-cylinder vertical type the cost of production alone would almost prohibit the employment of internal flywheels and built-up crankshafts, and as this is the power plant I favour for the post-war machine, I must plump for the solid crankshaft; in fact, even for any other type of engine my convictions would not permit my doing otherwise. It is not sufficient, however, to stipulate the class of shaft and leave it at that, for crankshaft design is much too important a subject to be so lightly dismissed; indeed, it is the most vital part of any type of internal-combustion engine. With a solid, sturdy shaft, soundly balanced, and a decent cylinder a respectable power output is assured, but let there be the slightest whip; then, despite all efforts, at a certain engine speed it becomes impossible to obtain any increase in power. Balance, or rather lack of balance, has a similar effect; therefore it is desirable that a shaft which may be almost perfectly balanced should be chosen.



"Cooee's" suggested type of crankshaft.

The Choice of a Bearing Shaft.

IN existing designs, speaking only of four-cylinder vertical engines, there are three examples from which to choose. These are known as the three, two and five-bearing shafts, taking their names from the respective number of bearings upon which they are supported. In large engines three-bearing crankshafts are generally fitted, but makers of small fours favour two-bearing shafts. Five-bearing shafts, however, are hardly ever found in modern engines, although at one time they were used almost generally. A desire to reduce overall engine length and to use block casting in lieu of individual cylinders has no doubt been responsible for the exit of five-bearing shafts; nevertheless, the practice of supporting the shafts at five points has much in its favour, and had it been possible to overcome the above defects this design of shaft would certainly never have been dropped. Rigidity is most essential in any crankshaft, and as the elasticity of all classes of steel varies but very little, apart from supporting bearings, this feature may only be obtained by increasing the dimensions of the shaft. It is obvious that when there are several throws between the supporting journals, as in the case of a two-bearing shaft, the diameter must be considerably greater to withstand the bending stresses than when the throws are supported upon each side. The dimensions of a shaft are usually determined by the bearing surface required and rigidity, the former being governed not by explosion pressure, as is generally accepted, but by the inertia of the reciprocating parts. It will be clear, then, that the overall length of a shaft cannot be cut down to any appreciable extent by reducing the bearing length if plain bearings are retained. There appears no necessity, however, to use this class of bearing, especially as it is not the equal of the radial ball bearing and is greatly the inferior of the roller. By applying roller bearings to both the big-ends and the journals it is quite possible to keep within the length required for a monobloc cylinder casting and at the same time to obtain better results, as every throw may be supported upon each end of the crankshaft. This will be obvious to the reader.

A Suggestion.

FOR this purpose the roller bearing would have to be of the type in which the outer race threads over the journals, as is shown in the illustration. A recess integral with the shaft forms the inner race, and the rollers are inserted, with the outer and inner races in position, through a small gap in the end thrust plates of the races, as is common practice in ball-bearing construction. This method of construction is clearly shown in the sketch, in which also will be noticed a similar big-end assembly, both of which are cheap to produce, efficient in service and without loose retaining rings, washers or distance pieces of any description. Further, they are almost noiseless in action, and permit the retention of a short, sturdy, solid, one-piece crankshaft. The only difficulty they present in application is the necessity for almost perfect alignment of all supporting bearings, which may be overcome to a great extent by using a central bearing of the self-aligning ball type, which would add but little to the length of the shaft. COOEE.

A13

——NEWS *in* BRIEF.——

Lighting-up Time for Saturday, 11th May, 1918.

London	9.6 p.m.	Edinburgh	10.9 p.m.
Newcastle	9.28 p.m.	Liverpool	9.26 p.m.
Birmingham	9.17 p.m.	Bristol	9.16 p.m.
Dublin	10.3 p.m.		

Lighting-up time in Ireland and Scotland is one hour after sunset, but the Scottish Lighting Regulations (Vehicles) come into effect half-an-hour after sunset.

Lighting-up time in England and Wales is half-an-hour after sunset.

Moon.—New moon 10th.

"Not All the Perfumes of Araby——"

THE recent decision to dye military petrol red in France calls forth a bon mot from a writer in the "Financial Times." "The appropriator of official petrol," we read, "will provide the evidence for his own conviction, for he will be taken, so to speak, red-handed."

War-worn Machines Sold Cheaply in France.

THE sale of rejected French Army motorcycles continues in Paris almost week by week. At the Champ de Mars recently 20 motorcycles, nearly all of French make, were sold at prices ranging from £4 to £20. At Vincennes an even more dilapidated assortment was offered, one machine actually being sold for £1. Sidecars fetched from one to three pounds.

Alleged Theft of State Minister's Motorcycle.

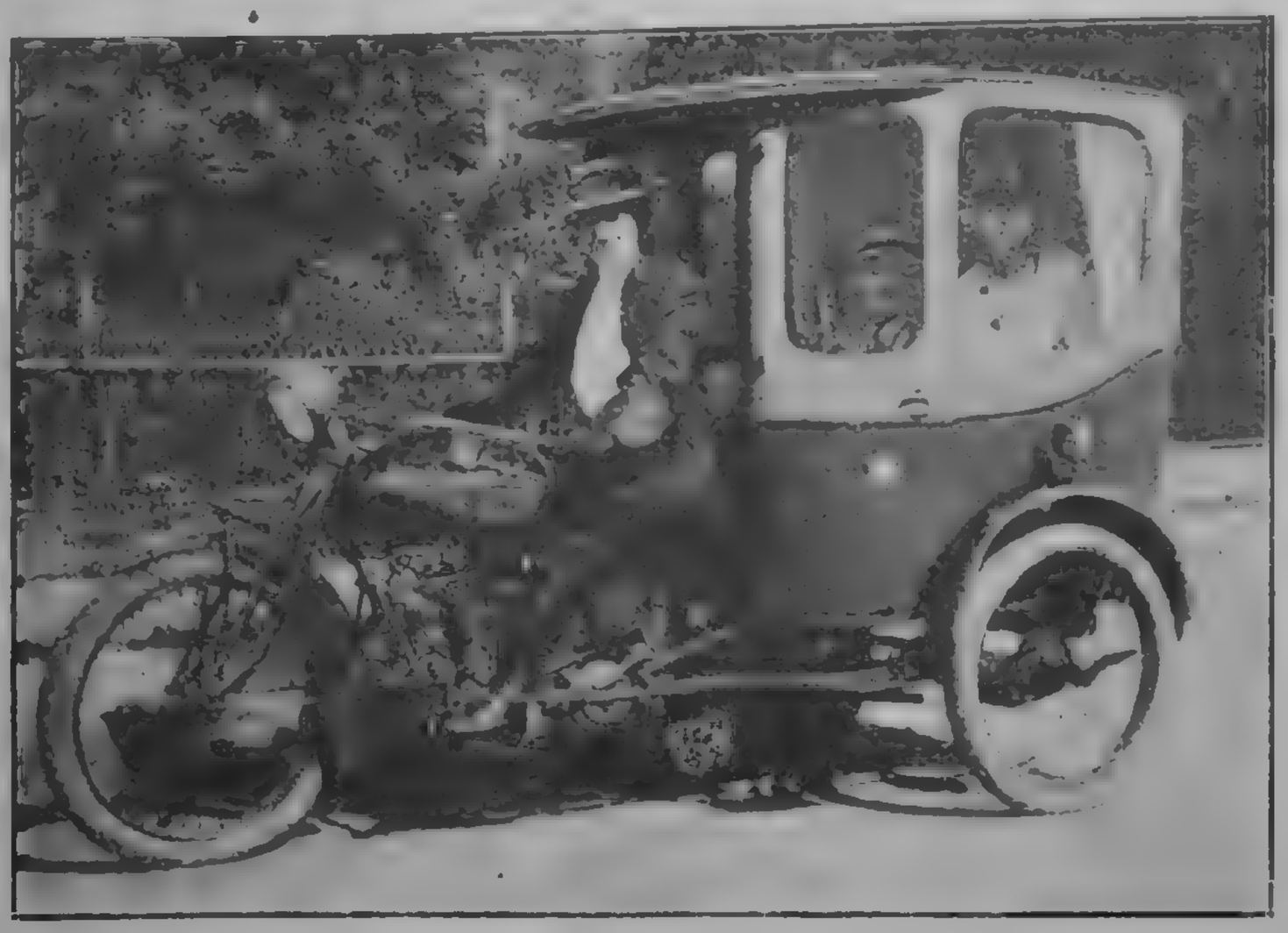
A CARMAN was recently charged, at the Mansion House, with being concerned in the theft of a motorcycle, valued at £90, belonging to Lord Beaverbrook, the Minister of Information. The accused stated that while he was unloading his van two men asked him to take a motorcycle to Waterloo Station; he agreed, and helped to put the machine on the van. At Waterloo he was asked to drive to Smithfield, and did so. Arrived there, the motorcycle was taken out of the van, and the men went away, making no return—"not even a 'thank you.'" The accused was remanded.

Road-making During Demobilization.

A HIGH note of indignation is sounded by "Red Cap" in "The Irish Cyclist and Motorcyclist" anent a part of the Automobile Association's peace manifesto which states, as one of its aims, the employment of armies upon road construction during demobilisation. "To urge the employment of the idle citizen army on navvying work in order that those who stayed at home will have smooth roads to ride upon is something out of tune with the Association's good work and sound policy in the past," states "Red Cap." Upon the other hand, there must be thousands of pre- and after-war motorists who would willingly lend a hand to this great and necessary work; would, in fact, sooner get down to it themselves at once than wait about for years, perhaps, until the necessary labour is available. It seems a pity that this voluntary labour could not be taken advantage of, when the time comes, to the benefit of all parties concerned.

What There is in a Name.

A DETERMINED effort is being made in America to suppress adjectives hitherto applied indiscriminately and inappropriately to motor vehicles, which are calculated to prejudice popular feeling against such vehicles which in the majority are now purely utilitarian. Hence American technical journals now refer to the erstwhile "pleasure" car as the "passenger car"; to the "speedster" as "the runabout," and to the "sports" vehicle as "cross-country." Probably the embittered pedestrian only retorts that a motor by any other name would smell as vile.



This "motorcycle limousine" is the property of Miss A. Christiansen, of Bronx, N.Y. She prefers this Indian combination to a car, and employs a woman driver exclusively.

Federal Control of Australian Racing.

A STRONG agitation is in progress for the inauguration of a Federal body, to consist of delegates from each governing State club, to control motorcycle racing in Australia. Representatives of the technical Press and of the trade in Melbourne are being invited to meet and to draw up rules for governing the pastime in Victoria, and these rules are to be submitted to the other States. If considered satisfactory, it will be urged that they shall be adopted throughout the country. By this means, as the Federal body could be affiliated with similar institutions in England and America, any records put up in Australia might be recognized throughout the motoring world.

Moon Charts for May.

MOON charts for the month of May, compiled by Mr. A. H. Midgeley, chief engineer to the concern, are again available upon application to Messrs. C. H. Vandervell and Co., Ltd., Acton, London, W. 3.

Motorcyclists Urgently Required by Exeter V.M.C.

AN interesting meeting of the Exeter section of the Volunteer Motor Corps was held in Exeter recently, when strong appeals were made for recruits. Various stirring addresses were given, in the course of which it was pointed out that the important thing was to be prepared to move material in case of emergency, while in addition a light squadron must be ready to move men. In this county about 100 men were wanted, thoroughly trained and ready to do the work required at a short notice. There was no excuse for anybody who had a motor vehicle to hold back at this critical time. The drill they would have to do was nothing like so hard as that of the ordinary volunteer. The chairman stated that more than the minimum number of motorcyclists would be required for the emergency section.

News in Brief (contd.).

Stamping Out the Motorcycle in Colorado?

PROPRIETORS of motorcycle garages in the city of Denver, Colorado, are compelled to take out a licence, which costs them 75 dollars annually, from the City Council. Is this an attempt to discourage motor cycling in Colorado?

Carbide Produced in Tasmania.

CARBIDE is now being produced in Tasmania, by means of the cheap electricity obtained from available water power, and it is anticipated by our contemporary "Motor Cycling" of Australia that Australian carbide will be on the market within six weeks. An expert has been imported from Switzerland to control the production of this commodity.

"Clincher" London Premises Commandeered.

GREAT difficulty has been experienced by the North British Rubber Co. in acquiring new premises for their London business house, the Government having found it necessary to commandeer the Great Portland Street offices. The company have been obliged to compromise upon two separate buildings; one at 111-113, Great Titchfield Street, Oxford Street, W., where the business of the London tyre department will be conducted, and one at 257-259, Oxford Street, W., which will constitute the new export department, advertising and general manager's London office. To these respective addresses all communications for the London office should in future be addressed.

A Harley-Davidson, licensed as a hackney-carriage, in Bodmin.

Optimism in Excelsis.

SURELY he must have springs such as pass the comprehension of man who wrote to a contemporary recently in this strain:—"By the way, you mention this week under 'Things we have observed' that nearly all the English roads are in a bad and even dangerous condition. Someone has been pulling your leg! The case is precisely the reverse. I have never known the roads in better condition, generally speaking, than they are here to-day, with a few exceptions in the neighbourhood of large military camps." We do hope the Roads Improvement Board authorities will not see this.

Manchester Against the Gas Restrictions.

SOME consternation has been caused in Manchester by the recent Order affecting gas supplies for motor users south of a certain boundary, by which Order users in Manchester were naturally affected. Gas fuel has been largely employed in this city and a large number of motor vehicles has been equipped for its use. A deputation is shortly to wait upon Mr. Walter Long with a view to lodging a protest in this direction.

Another Cap Campaign?

OUR bright contemporary "The Irish Cyclist and Motor Cyclist" is raking up an old controversy, worn almost threadbare some time ago, from a new starting point. "American motorcyclists, judging from the photographic illustrations of our transatlantic exchanges, are still capable of driving their machines whilst wearing their caps with the peak in front," exclaims our contemporary. America! hide thy diminished head in shame. No British motorcyclist will be able to know an American one after the war if this sort of thing is going to be allowed to go on.

Wasted on Ireland.

A TWENTY-FOUR hour train, tram and taxi strike in the Dublin district is the latest from Ireland. Motorists here would have welcomed such an opportunity of using up petrol supplies quite legitimately for once under the Motor Spirit Restriction Order.

Vertical Gas Engines Expounded.

WE have received a copy of an interesting brochure dealing with vertical gas engines, their field of service, construction, principle of operation, etc., which should provide useful reading for all power users. A copy of the brochure, which is produced by the Vacuum Oil Co., Ltd., Caxton House, Westminster, may be obtained post free upon application.

A New Chairman of the M.C.S. A.B.M.A.M.

IN consequence of the resignation of Mr. Charles Marston, of Sunbeam fame, who resigned the position after the death of his father and mother, Mr. J. W. Stocks, general manager of Components, Ltd., has been appointed chairman of the Motor Cycle Section of the Association of British Motor and Allied Manufacturers.

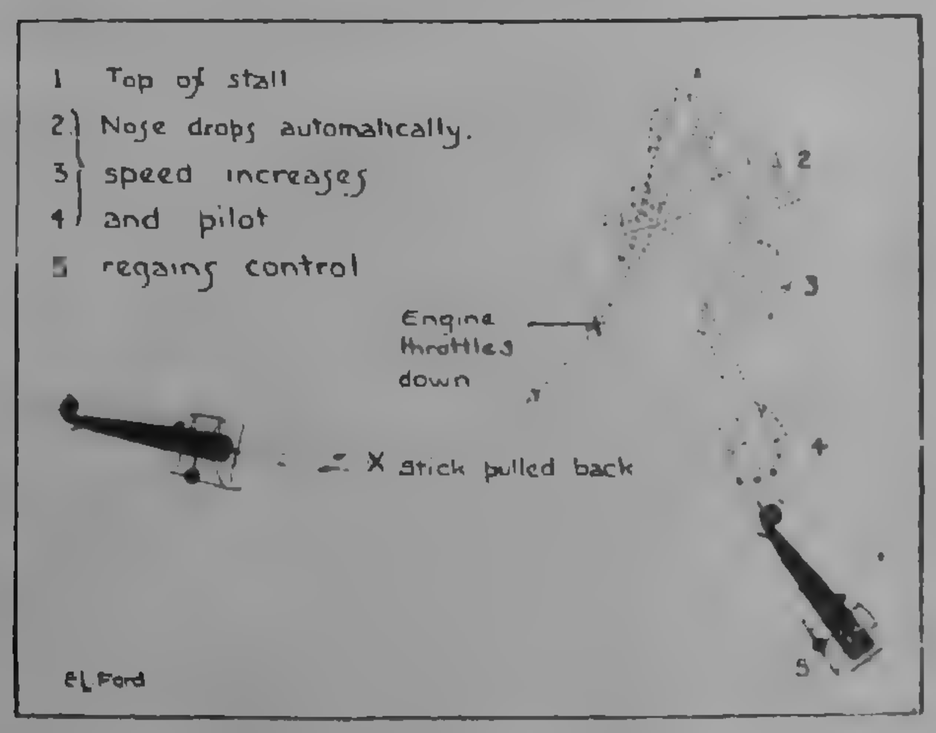
Not a junk heap, but merely a collection of war-worn motorcycles awaiting their return to the factory, whence they will emerge almost as new.

THE "IMMELMAN

Flying Stunts and

IT seems but yesterday that thousands were flocking to Brooklands to watch Pegoud loop the loop. What a breathless manœuvre; what moments of tense anxiety as once, twice, thrice the spectators below viewed the top of the wings of the aeroplane above. How graceful, how natural, and yet how daring!

To-day, a glance at "Practical Flying," a new manual on the Service course of instruction for pupils



The effect of stalling the machine.

training as pilots in the Royal Air Force, shows that looping is but a very ordinary manœuvre, and exceeded in a spectacular sense by stunts which apparently are still more difficult to execute. The execution of various evolutions, practised for exhibition purposes before the war, have become part of the stock-in-trade of the experienced pilot, maintaining the British supremacy of the air against the enemy. They are just manœuvres which any pilot can perform: at least that is the impression one gathers from the very matter of fact instructions given in this remarkable manual.

Trick Flying for Aerial Fighting.

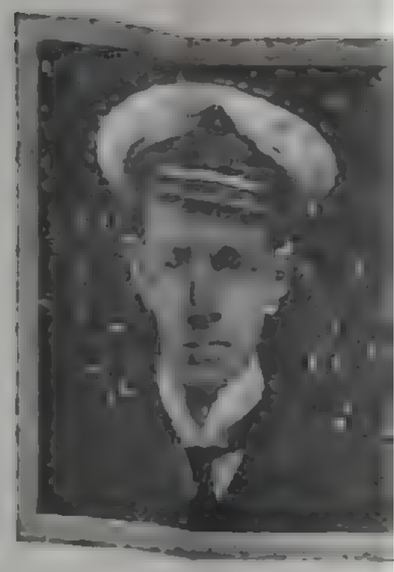
So they can be with the aid of the very precise instructions supplemented by numerous sketches given in this work. As is pointed out by the writer of the book, Flight-Commander W. G. McMinnies, R.N., formerly editor of MOTOR CYCLING: "For war purposes and aerial fighting, the man who can manœuvre his machine the quickest obviously stands the best chance of downing his adversaries." Provided that enough height is allowed for trick flying "there is practically no positional manœuvre which it is not possible to perform on a machine or from which the machine will not right itself—generally more or less automatically."

To loop may easily prove the sequel to a nose-dive. As the pilot brings his machine out of a dive at a height well over a thousand feet in order to allow plenty of room for eventualities, he pulls the control lever back firmly but not too quickly. "He will feel the machine levelling up, and as the air speed indicator does not register as quickly as the machine changes position, he must not centre the stick until the instrument shows him that he is somewhere near his lowest flying speed. A nose dive can easily be followed by a zoom if the pilot pulls the control lever back rapidly.

"Should he do this, and should he, in addition, put his engine on full at the same time as he pulls back his stick to the limit, he will, in all probability, loop, although this is not by any means the safest or best

method of performing this very simple but, at the same time, very effective manœuvre.

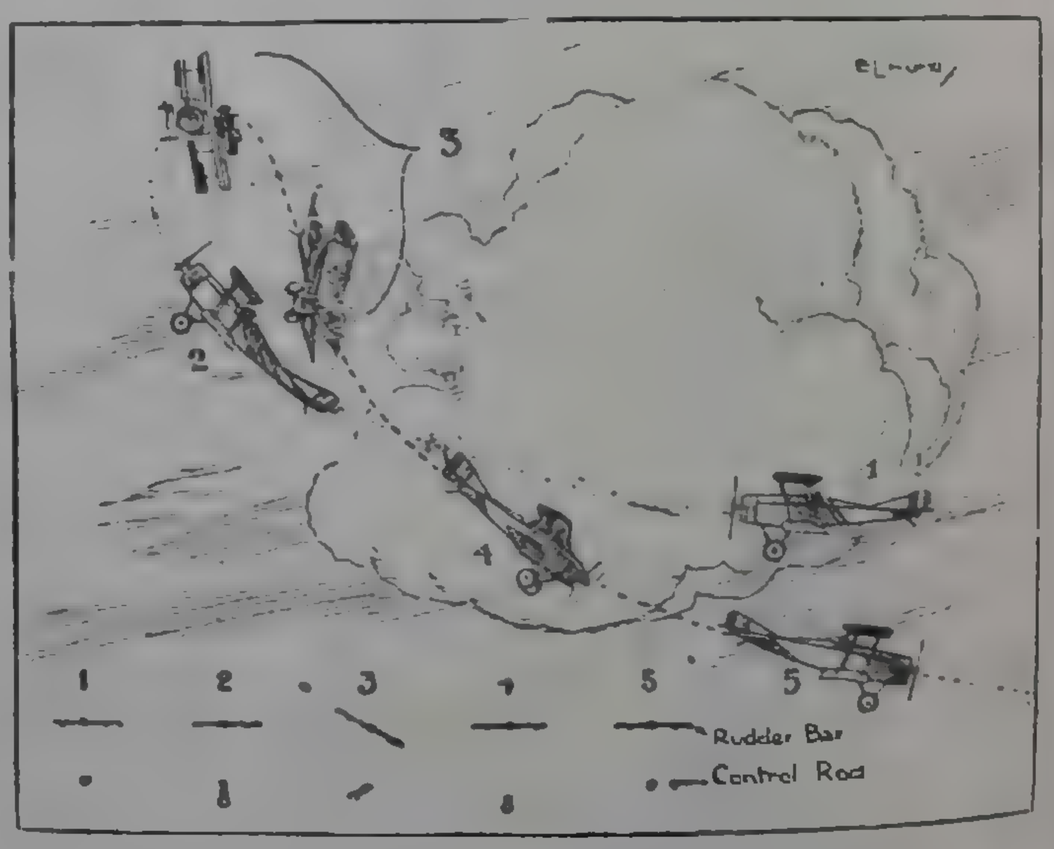
"A pupil who wants to loop should select a machine that is known to loop easily, such as an Avro or B.E.2c. He then ascends to a height of 3000 or 4000 ft., gradually puts the nose of the machine down to a speed of 80 m.p.h. or 85 m.p.h. (75 knots or 80 knots), attaining this maximum by a more gentle descent than would be possible if he attempted to nose dive to this speed. He then pulls the control lever as far back as it will go, in one firm, strong pull, the effect of which is to cause the machine to rear vertically upwards and over. When he is upside down, he will see the ground below him and must then cut off his engine and a few moments later ease the stick, gradually centring it. The engine can be switched on again when the steepness of the nose dive has been materially decreased. The first part of the pull-back should be slower than the latter, on account of the greater speed of the machine in the early stages of the loop. The control must be held back until the machine has completed the loop."



The author, Flight-Commander W.G. McMinnies, formerly editor of "Motor Cycling."

The Immelman Turn.

Here are a few more stunts described by the author, beginning with the "Cartwheel," which can be mistaken for a loop in certain circumstances by spectators on the ground. "It is performed by getting up a little speed, by putting the control lever forward and then pulling it back, as in a zoom. When the machine is almost standing on its tail, but before it has lost flying speed and controllability, apply rudder



The famous Immelman turn, in which the machine rears up, turns sideways over the vertical, and comes out facing the opposite way.

and bank in the same direction. The machine will answer to the controls, cartwheel in the air, and come out facing in the opposite direction. A slight modification of this manœuvre results in the famous Immelman turn. The engine can be cut out when the machine turns about, and will allow it to dive, but if the stick is held fully back the machine will come out of the dive quite easily. This manœuvre can be

ELMAN TURN."

How to Make Them.

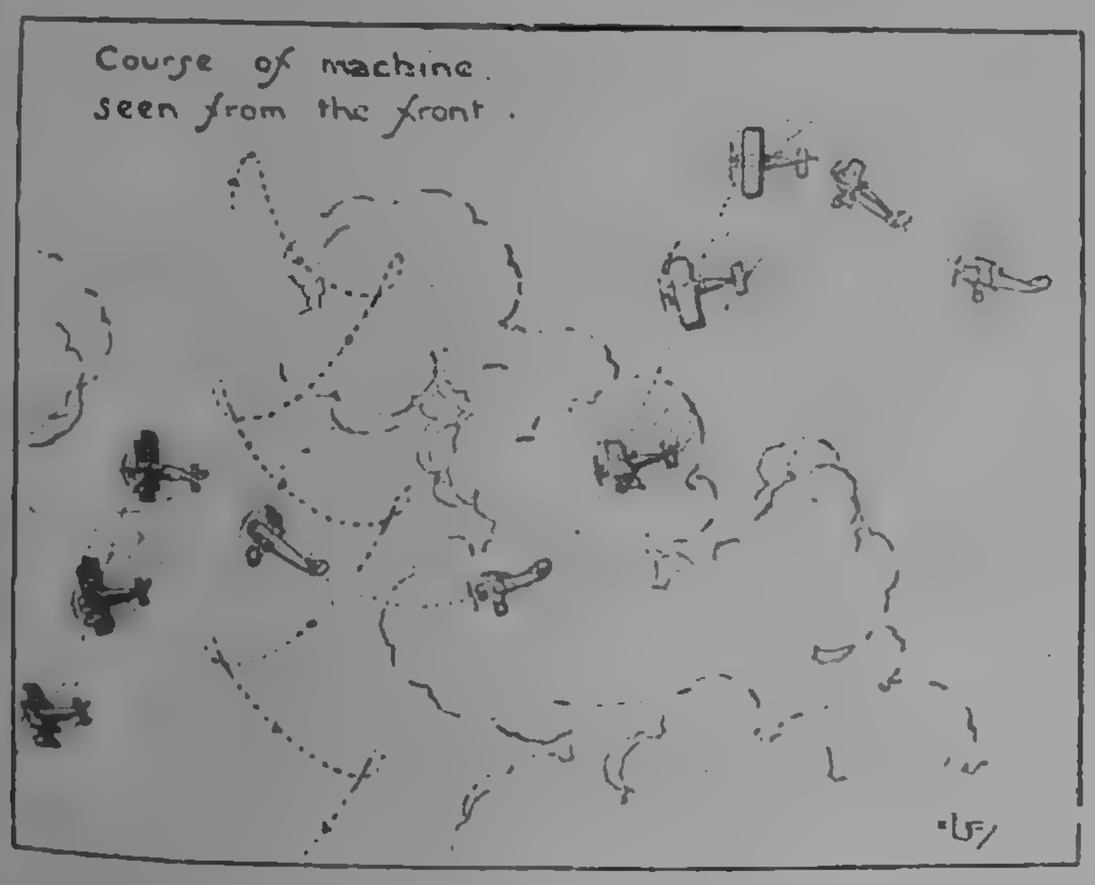
uthor, Flight-Com-
r W. G. McMinnies,
ly editor of "Motor
Cycling."

done with the engine off, the necessary momentum for the ascent and the cartwheel turn being supplied by diving. When the machine is pulled over, first on one side and then on the other, in the course of a long descent, the manœuvre is sometimes called "Boot-lacing." Stalling turns are very similar to these manœuvres, except that all way is lost at the top of the pull-back, and the machine then drops its nose suddenly and falls over on one wing tip, and so comes under control again. The 'Failing-leaf' descent is a modification of this manœuvre.

"Another favourite trick of experienced aviators is to stall, or tail slide, the machine at a fair height and allow it to flutter down some distance. This is done usually by cutting out the engine and pulling the control lever back. The machine then loses its flying speed and falls over on one wing or slides back tail first. If the nose is put down or the engine restarted, the machine will gather speed again and the pilot will regain control. If the engine is cut off and the pilot holds the control lever back all the time, he will come down in a series of stalls and their ensuing dives.

Tail Spinning.

"A tail spin, sometimes performed unintentionally by inexperienced pilots, is another stunt practised by skilled aviators. Sometimes it is achieved in conjunction with a nose dive, in which case the evolution goes by the name of the spinning nose dive or corkscrew spiral. What happens in this case is that the pilot stalls his machine, pulls the control lever towards him and fully back. He does this with the

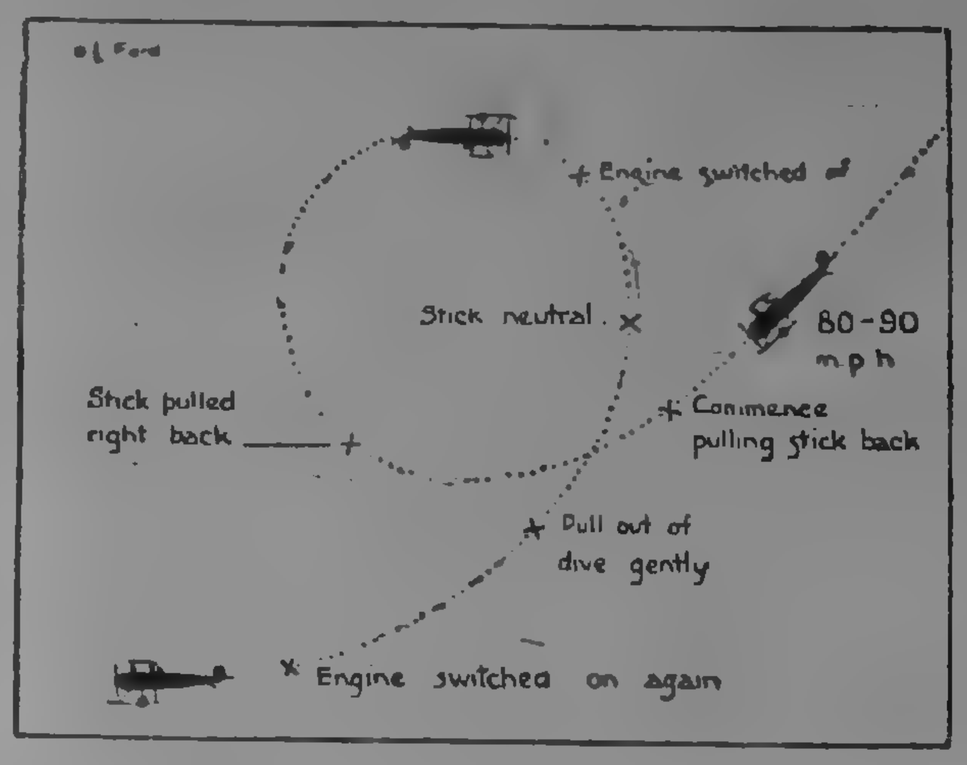


The falling-leaf descent, with the engine cut out. The machine flutters through the air as shown in the sketch.

engine off, and then rudders hard in the direction in which he desires to spin. He can get out of the spin, if he has sufficient height, by placing the controls—rudder and stick—central, whereupon the machine will take on a nose dive, when the engine can be restarted and the flight continued in the ordinary manner. Pupils who find themselves in a spin unintentionally must remember this. It is generally found that a pupil will get into a spinning nose dive through making a faulty spiral on certain types of machine on which the area of the stabilizing tail fin is too small."

These brief extracts by no means give an idea of the scope of "Practical Flying," but they are interesting as showing how very simple after all are the most daring manœuvres.

This is the first practical work on the tuition of flying for Service purposes. It explains in terms



The proper way to loop.

which are easily understood by a beginner the whole art from first principles to night flying and more advanced manœuvres such as will be necessary in aerial fighting. As Major-General Brancker, in his introduction to this work, points out, it appears at a propitious moment as "a valuable addition to existing official publications." The subjects embrace preliminary ground work, tuition of flying, preparations for cross-country flights, long distance flying, night work, aerial stunts, map reading, the use and working of the instruments, etc.

The Science of Flight Instruction.

We are training thousands of prospective pilots, and we shall need many thousands more, for the aeroplane may well become the deciding factor of the war. The old days of uncertain instruction have gone. The training of a pilot is a science. The pupil follows a set course, which is memorized in a précis appearing in an appendix to the book, which can reasonably be expected to make him an efficient pilot if he has it in him to become one, for not all pupils will become pilots, lacking the nerve, the skill or the judgment for which aviation calls. Hitherto there has been nothing available in the form of a manual that deals with the practical instruction of a pupil, but here we have the whole course set out, abundantly illustrated in a form that will impress many important points and thus make flying more easily taught and learned. The artist, by the way, Flight-Lieut. E. L. Ford, R.N (now Captain, R.A.F.), is an ex-member of our staff. It is hoped that a study of the chapters on elementary flying will enable the beginner to avoid many of the mistakes so commonly made while under instruction.

"Practical Flying: Complete Course of Flying Instruction," with an introduction by Major-General W. S Brancker, C.M.G., Comptroller General of Equipment to the Royal Air Force, by Flight-Commander W. G. McMinnies, R.N., illustrated by Flight-Lieutenant E. L. Ford, R.N., with a chapter on the medical aspects of aviation by H. Graem Anderson, M.B., Ch.B., F.R.C.S. 3s. 9d. net, post free 4s. Temple Press Ltd.

EFFICIENCY IN LUBRICATION.

Oil Injection Necessary at the Point of Maximum Pressure—A Description of a System Which Achieves This Object.

I HAD no idea when the Editor invited me to write an article upon lubrication that Mr. Heather intended treating the subject at such length, but had I given the matter a second thought I should have known that it was impossible to consider a post-war design for a motorcycle without attempting to improve lubrication, which is one of the most essential features of to-day. The owner of a machine wants it to be serviceable, efficient and reliable, so as to produce a given output of work in a given period of time. He aims at eliminating all chances of breakdown in his machine.

Efficient lubrication is of vital importance to every motorcyclist. Excessive wear and tear caused through a poor oiling system necessitates constant renewals, and reliability demands adoption of the most advanced method. In a machine of any kind with moving surfaces, it is admitted by all that lubrication is indispensable, and that it must find a place and be provided for, the only question being how? The whole art of lubrication is to get a film of oil between the working surfaces, particularly where such surfaces are exposed to maximum pressure. Usually the oil is introduced to the working parts of the machine at the various points of no pressure, and the oil is expected to distribute itself and get wedged in between the surfaces exposed to maximum pressure. It is just here where failure of lubrication so often occurs. Instead of oil being wedged in under the surfaces of maximum pressure, it frequently gets sheared off. The lubrication of bearings for line shafting and machinery has reached a much higher standard than has yet been attained in the internal-combustion engine. It must, however, be admitted that the latter presents greater difficulties in the way of efficient lubrication on account of the burning of the oil.

Mr. E. J. Tilston, the writer of this article, has devised many ingenious systems of lubrication. He is, perhaps, best known to our readers as the inventor of the famous Tilston two-stroke engine.

If a film of oil is introduced with certainty where the maximum pressure obtains, it not only eliminates wear, but the oil is kept clean. To prove this statement, consider the movement of a 40,000-ton Atlantic liner travelling to America. In this case there is water (not oil) interposed between the bottom of the ship and the bed of the ocean, consequently there is no wear. The conditions would be much improved if the ocean were oil and not water, thus preventing corrosion and other factors. If it were possible to run a ship in a covered bath of oil where dust could be eliminated, although the pressure were a hundred times greater than that of the "Lusitania," there would be no deposit in the oil from the motion of the ship.

The system of lubrication which I am about to describe begins by forcing the oil in between the shaft and its bearings at the point where it is required. This is done by means of a pump which is about $\frac{1}{16}$ in. diameter, with a stroke of about $\frac{1}{4}$ in. Preferably one such pump is provided for each bearing. It works in a closed circuit of oil, and the same oil is used over and over again. Whenever the pressure per square inch between the shaft and its bearing increases, due to the weight of the shaft or to external stresses, the pump automatically raises the pressure of oil to meet and overcome this resistance, and forces it through to form a positive and unfailing oil film between the two surfaces exposed to maximum pressure.

It follows that if a constant film of oil is maintained between the surfaces exposed to maximum pressure, viz., between the revolving shaft and its stationary bearing, there can be no wear. The absence of wear between the metallic surfaces protects the oil from being fouled by impurities ground from the shaft or its bearing, and, further, the alignment of the shaft can be maintained for an indefinite time, thereby prolonging the life of the machine of which the bearing forms a part.

When a single pump is used to supply a number of bearings, the amount of oil reaching any given point obviously depends upon the resistance of the passage to that point from the pump. The bearing having the longest pipe, the most bends, or faulty outside connections, will not get its proper quantity of oil, if any, and provided that everything is perfect the oil in such a system must be led in at the point of minimum pressure. This, to my mind—although the gauge may show a pressure on the pump—is not forced lubrication, and does not guarantee a film of oil where required.

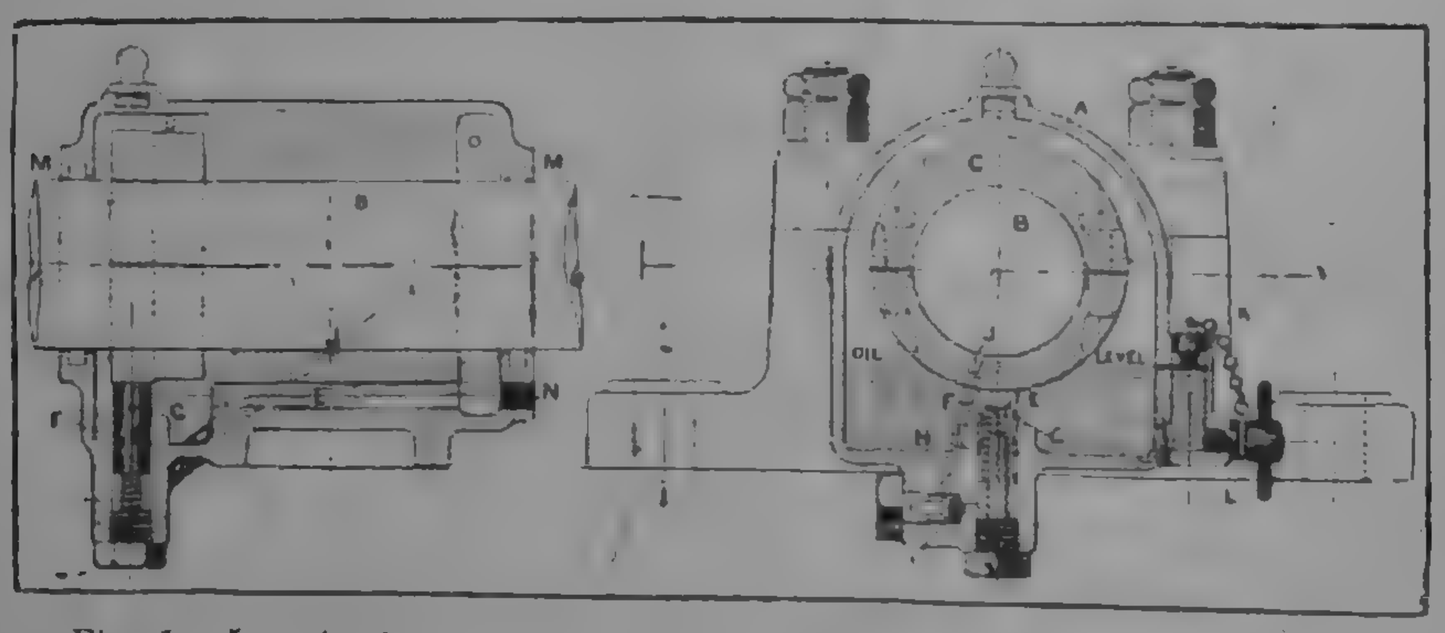


Fig. 1.—Longitudinal and transverse section of bearing fitted with a true system of forced lubrication.

The late Professor Nicholson, of the Manchester School of Technology, says "By the use of a pump to force the oil from a reservoir into the bearing near the point of maximum pressure, the length of the bearing can be very much diminished, even for the slowest speeds, especially for journals where the load and rotation directions do not change. In all probability the length need not be more than equal to the diameter and if this be so it means that the use of such bearing implies the possibility of reducing the friction of the line shafts by about two-thirds of its present amount. With

Efficiency in Lubrication (contd.).

such a bearing there ought to be no wear at all, except that due to the absence of an oil film at starting up."

Fig. 1 illustrates respectively a longitudinal and a transverse section of a rigid bearing. It is shown without any bronze or white metal lining; as a matter of fact, cast-iron is the most suitable if an oil film is ensured. It will be observed that the pump (F) is surrounded by a reservoir of oil, which has the effect of flooding the inlet openings (G) in the pump. In this way a suction valve is dispensed with, and the pump plunger is, in effect, its own valve.

How the Force Pump Works.

The action of the pump is as follows:—When the pump plunger (F) rises to the top of its stroke, the inlet openings (G) are fully exposed, and the oil from the reservoir or end chamber (D) flows through these openings, filling the available space in the pump chamber. In making the return or downward stroke, the inlet opens and the pump plunger gradually passes into the pump chamber and finally cuts off the connection between the pump chamber and the external reservoir (D). The remainder of the downward stroke forces the oil imprisoned in the pump chamber past the non-return delivery valve into the delivery channel, and thence into the bearing on the surface exposed to maximum pressure at the point (J). This action is repeated with every revolution of the shaft. It will be observed that each stroke delivers a definite volume of oil to the bearing, and at the same time displaces an equal volume from the bearing. The displaced oil falls into the chambers (D and D) provided at each end of the bearing, and flows back, by simple gravity only, through the passage (E) into the reservoir surrounding the pump.

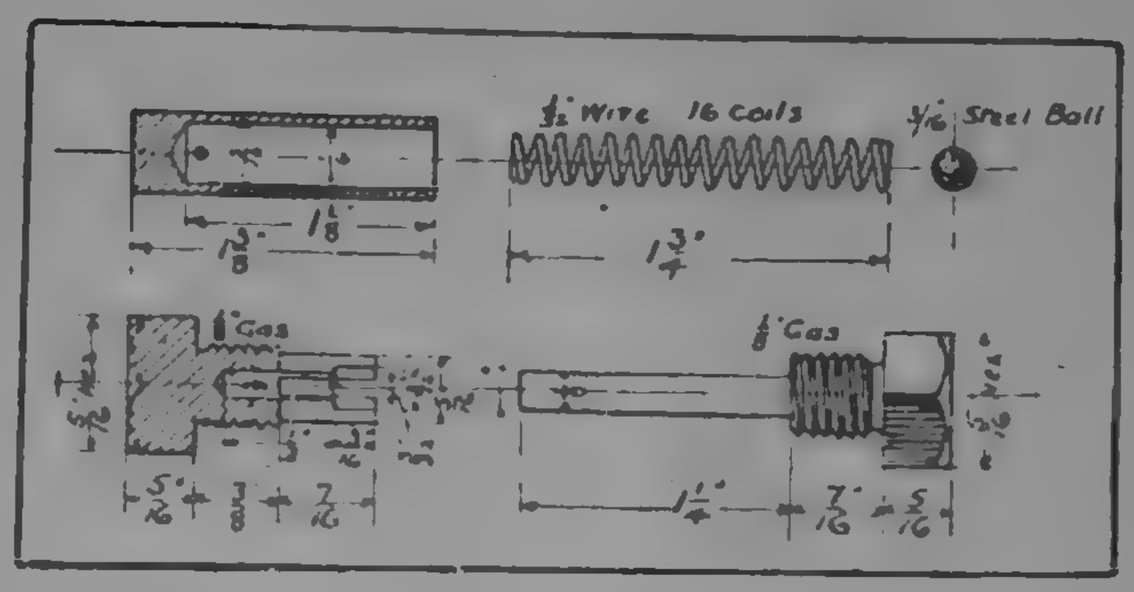


Fig. 2.—The components of the force pump.

This is accomplished by a pump comprising five parts (see Fig. 2). Should it be necessary to examine the pump, the whole mechanism falls into the hand by taking out the plug underneath the pump plunger. No outside connections are required, and if at any time you doubt the working of the pump a pressure gauge can be fitted whilst the machine is running. By this system it is possible to ascertain exactly what takes place by reducing the clearance between the revolving shaft and the stationary bearing, and it is surprising what a difference in pressure shows on the gauge when the delivery passage at the point (J) is grooved for a short distance along the bearing. Valuable data can be gleaned by studying the gauge.

It is desirable to consider a proposition where six such line shaft bearings are arranged along a wall, as against six line shaft bearings fitted with a so-called forced system of lubrication fed from a central pump. In the latter case it would be impossible to introduce the oil in the bearing at the point of maximum pressure, inasmuch as the bearing offering the least resistance would receive all the oil. This is independent of allowing for the resistance of each passage from the pump to the bearing, the longest pipe, the pipe having the most bends and faulty connections.

Cheap to Install

In considering the cost of each system it is not only necessary to take into account the question of the copper pipes to and from each bearing and the central pump, but, as the late Professor Nicholson stated, "the length of the bearing can be very much diminished," and cast-iron used when the oil is introduced at the point of maximum pressure.

Fig. 3 illustrates a method of "wipe" lubrication that has proved very reliable. In some respects it is equal to the central pump system, without the disadvantage of costly and faulty outside pipe connections. It certainly ensures a good supply of oil always at hand in the receptacle above the bearing, which oil is picked up and used over and over again. The difference in the cleanliness of the oil in the "wipe" and that in the "forced system" is readily realized after a short period of working.

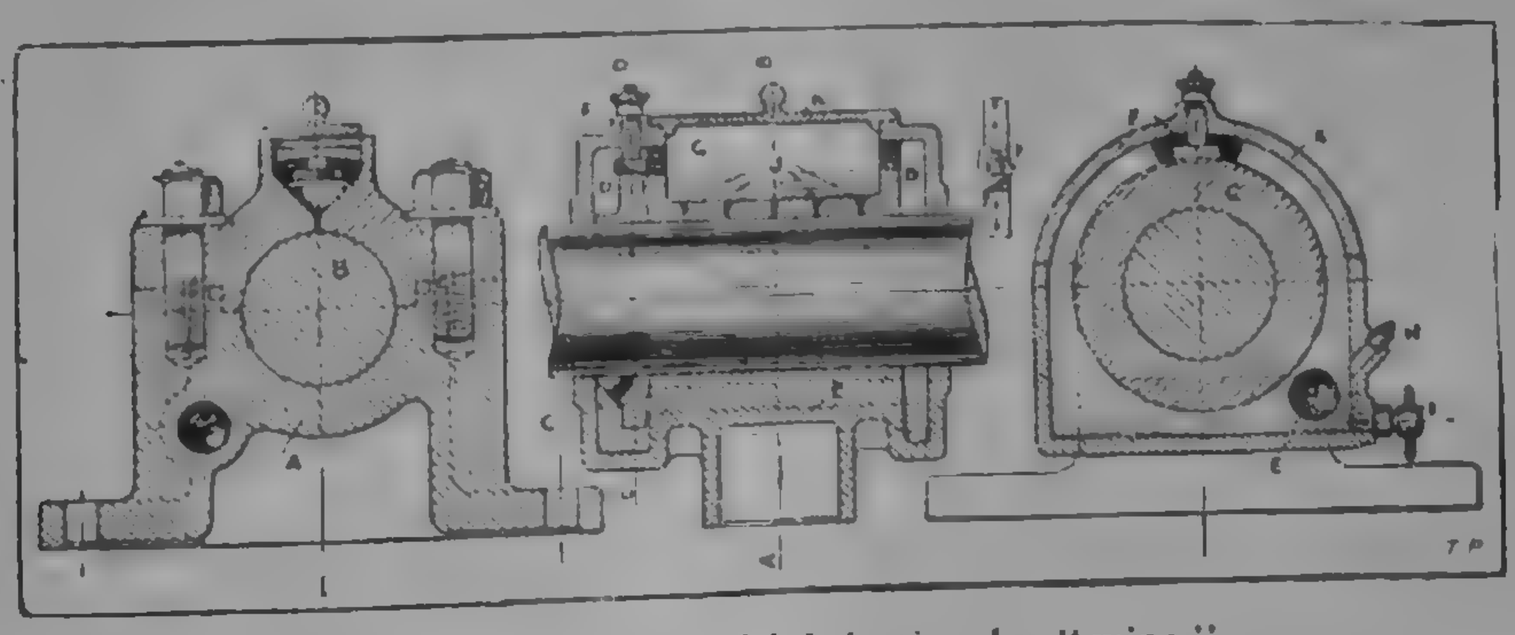


Fig. 3.—A system of lubrication by "wipe."

Eighteen Months' Running on One Pint of Oil.

Some years ago, at an engineering exhibition, the writer was demonstrating two bearings with a system of forced lubrication which had been running 18 months on one pint of oil—the said pint being pumped through the bearing every five or six minutes—when a critic exclaimed that it was impossible to run a bearing a month without the oil becoming filthy and its lubricating properties destroyed. In order to prove his statement he cited a bearing in his own works which caused considerable trouble through overheating, and the oil passed from the bearing in a dirty state. Inquiry elicited the fact that the bearing was considerably overloaded, and it was impossible to make the bearing surface longer to stand up to the work on account of the close proximity on either side of an eccentric and flywheel. Unfortunately the oil was led into the bearing at the point of minimum pressure. Although he had fitted a forced system the introduction of the oil thus did not ensure a film of oil where it was required, and consequently the rubbing of the revolving steel shaft and the stationary brass bearing had caused the deposit.

In this article I have given the latest methods of lubricating that are known in connection with bearings where the load and rotation directions do not change. In the next instalment I will endeavour to show how this system can be applied to motorcycles and motor design in general.

(To be continued.)

The Healthy Outlook for the Motorcycle.

The Peace-time Rush which will Ensue.

JUST now we are at sixes and sevens, but one day the world will wag again. No one of us knows how or where he will come out, and it seems likely that the first may be last and the last first. But here and there in the smoke we catch glimpses of some things that are firm enough to stand through the racket like our old buildings that have frowned on five hundred summers and smiled on a score of wars. They remain: but we pass.

Looking out to the future, then, what do we see? An army—several armies—of people who can drive motors, of people who have been served by motor transport daily and nightly: to whom motor transport is as usual a thing as a fireplace in a house. And the overwhelming majority of these people will be possessors of modest incomes. To buy some kind of motor transport for their business or their pleasure will be as natural to them as hiring a house. The overwhelming majority will buy the motorcycle because it is the cheapest, the lightest, and the handiest way of taking two persons or light goods about that ever was. It must be cheaper and available in large quantities. There will be a boom, and there is not likely to be a slump, almost at once, because the machines will be required mainly for business work.

The Motorcycle's Wide Appeal.

In all likelihood the prospect for the motorcycle is rosier than that for any other form of motor vehicle. The car maker cannot tell whether to design, say, for a £250 market or a £500 market: especially in the higher grades is the demand impossible to gauge aright. The motorcycle, on the other hand, is going to tap two classes—the men who have risen a bit and the men who have fallen a little. That is, it will extend its boundaries in both directions and it has at its command a most valuable sideline—the motorcycle and sidecar combination as a light delivery van. This is worth developing, particularly in the form of a quickly detachable carrier that can be replaced by a sidecar body on normal lines. For this outfit there is a big future. There are thousands and thousands of small country tradesmen of all sorts who have been wanting something of the kind for years. Up to now they have not known how to drive and look after it. After the war they will understand how to do both. Every day a motorcycle maker ought to remind himself that his future customers are in almost hourly touch with motor transport and its drivers. It is level case for the lorry maker so far but there must always be more individuals with £50 than there are with £500, and here the motorcycle maker scores heavily. Besides, hardly anyone would use a five-tonner for a pleasure trip on the weekly half-holiday. The man who can shift his sidecar box and put the sidecar body on in a few minutes after dinner will see plainly enough that the business use of his machine is going to cover all his pleasure motoring. He will not grudge the pleasure motor tax.

From the taxation standpoint again, the motorcycle is likely to be less handicapped than the conventional car, which is as it should be. The motorcycle is the poor man's motor. In that overwhelming majority of cases I spoke of above, the motorcycle will be helping a man to earn his livelihood. It will not be a form of pleasure mororing, but something in the same category as the country baker's pony and cart.

The Two-stroke Popularity Forecasted.

The small two-stroke has not been so much to the fore on actual war service as the 3½ h.p. four-stroke has, and this for two reasons: firstly, because it is not so well understood, and, secondly and mainly, because war service loads are usually heavy, just as the war-service bicycle has to be heavier than the military rider's private cycle would be. In a cyclist corps, for example, it is obvious that the machines must stand up under their riders' weight with equipment—rifle, ammunition, etc.—and be capable of doing a bit of cross-country work into the bargain. The same with the motorcycle. The two-stroke is the machine for the doctor, parson, schoolmaster, and any other man who is constantly doing little runabout jobs and does not need to carry anything except a light bag. When designed for it, and properly driven, the more powerful among two-strokes take a light sidecar in a startlingly easy fashion and, furthermore, they can be produced at a price which the four-stroke cannot touch.

Prejudice dies hard, and I have known several people say they do not like two-strokes. There are persons who cannot see the man in the child. When pressed, they confess they know the four-stroke better. Certainly, one should not forget old friends, but that is no reason for not making new ones. My own opinion is that the man who does not snap up every chance of learning all the tips he can about two-strokes now is likely to get left in the sunny future, when every boy will buzz to school on one.

M.G.

A despatch rider in Macedonia attacked by wild dogs. A former member of our art department, to whom this experience actually occurred, writes that these dogs are half wolves and hunt in packs of anything from six to twelve in number.

NEW LAMPS FOR OLD.

Why Not Take Advantage of the Present Hiatus to Rejuvenate Your Old Machine?—How a Reader has Defeated Father Time.

HOW many readers are looking at their motor-cycles at the present time, and are being forcibly reminded that, while the shortage of petrol debars them from the many joys of the road, time is speeding as usual, and as each year rolls on so the value of their mount decreases accordingly! At the commencement of hostilities many riders were possessed of machines which first made their appearance on the road about the years 1910 or 1912, and while they were, and still are, capable of excellent service they will be considered old-fashioned after the war is over. Consequently, when it comes to selling these machines a much lower price will have to be taken, although many of them have covered very few miles during the last three years.

Being in this position myself, and not wishing to lose money, I cast about for a means to prevent it. The illustration will show what measure of success was attained, while the cost of the improvement was not by any means out of proportion to the result. The machine was a Triumph of uncertain date and had a straight top bar to the frame and a square tank. Most of the plating and enamel had disappeared. The engine, through having received every care and attention, was in excellent condition. During the present period of motor-cycling inactivity I decided to carry out the following work in my spare time:—

The author's reconstructed Triumph.

I made up my mind that thoroughness should be my keynote, so everything was dismantled except the crankcase; this I knew to be in perfect order. The front forks, barrel spring and bearings came out; the Sankey wheels (an addition made to the machine in 1911) and bearings were removed; the mudguards, together with the back and front stands, were taken off, and the carrier followed suit. After dropping the engine out of the frame, I removed the tank, and, finally, I took off the back part of the frame by drawing out the bolts at the saddle pin lug and bottom bracket.

I intended that my machine should be brought up-to-date in appearance, and I could see that an advantage in comfort would accrue from having my frame altered from a straight top bar to the later pattern with the sloping back. Obviously the new saddle position would be much better, in relation to the footrests, besides bringing the machine up-to-date in appearance. Accordingly I sent my frame with the necessary instructions to a reliable firm. A word of warning here is necessary: it is essential that this part of the work should be carried out by an experienced man.

While waiting for the return of my frame I started work on the various parts, so that they would be ready when wanted. Each part was taken in hand separately, and every sign of oil and grease removed. All old enamel was removed with a scraping tool, and all parts that had been enamelled were cleaned with emery paper. All parts and fittings that had been plated I cleaned with petrol, and while some remained in very fair condition others were quite hopeless and blistered with rust. These I emery papered until they had a fine smooth surface, as I had decided to enamel them; in fact, with few exceptions I intended to have an all-black finish.

The cleaning process finished, I now put into practice a tip I had been given by a friend, the result of which I had seen and entirely approved of. Instead of using ordinary enamel I procured enough Berlin black of the very best quality for my purpose, and proceeded to give a thin but even coat to all parts to be treated. When this was dry, which took about 12 hours, I gave a second coat, using a good mop brush and "flowing" the paint on. It may not be generally known that Berlin black dries a dead black, and if it has been put on with care it makes the parts treated look like dull ebony. Not a brush mark will appear anywhere. When the second coat is dry give a coat of the best varnish obtainable, using a good quality flat brush and taking care that the hairs do not come out. The result will satisfy most people; it gives a much better finish than ordinary enamel and it certainly wears better.

Having received my frame back and finding the alteration very well executed, I treated this in the same way. Next I took a template of the altered tank position and sent this to a prominent firm of repairers, in company with the tank, to be cut down and re-enamelled in original colours, together with the fittings to be replated. When this was finished I put the whole lot together, and, as the illustration of the finished machine shows, I have the satisfaction of knowing that when happier days come I have a good and fairly up-to-date machine. Further, I think I shall be able to get a far better price when I sell than if I had left things as they were. A.S.

Motorcyclist's Thrilling Race With Aeroplanes.

A THRILLING description of a motorcyclist's race through machine-gun fire with two enemy aeroplanes appeared in a recently-issued special "Gazette" of D.C.M. awards. The rider, Corporal H. Davey, R.E., of Hyde, volunteered to try to break through a village held by the enemy with an urgent despatch. He accordingly made a dash though the enemy were holding a cross-roads which was on his route, and who turned a heavy machine-gun fire upon the gallant rider. He was then chased down the road by two enemy aeroplanes, but managed to shake them off, and subsequently delivered his message. The feat was one of unequalled nerve and daring, and every motorcyclist will read of it with pride.

A23

THE EDITOR'S CORRESPONDENCE.

The Editor is not responsible for, neither does he necessarily agree with, the views taken by correspondents. Both sides of any topic are given equal publicity. A pen-name or initials can be given for publication, but the writer's full name and address must always be sent. All communications should be written on one side of the paper only.

Can an Aeroplane Hover?

Your correspondent, Mr. Wallis, is quite right when he states that it is impossible for an aeroplane to "hover" in the strict sense of the word. The effect of a headwind is, of course, to reduce the speed of the aeroplane, but there is another factor which often adds to the illusion. I refer to the clouds themselves. If an aeroplane is travelling very high and in the same direction as the moving clouds it appears to make no progress at all, and it can be marked only by lining it up by the eye with some stationary object such as a church spire or factory chimney. T.G.

Yarmouth.

Another Puzzling Problem.

I was interested in "H.C.T.'s" experience with his 6 h.p. Enfield as related in the issue of 23rd April, as I had a similar experience some few years ago with a 7-9 Indian.

After I had some slight repair done to it, I took it for a run. Upon arriving at my destination I put it on the stand, but when I came to start it again it could be moved neither forward nor backward. In this case a nut had been left in the crankcase by the people who had done the repair, and it must have fouled just as the machine came to stop. A. BENNETT.

19, Monument Park,
Wigan.

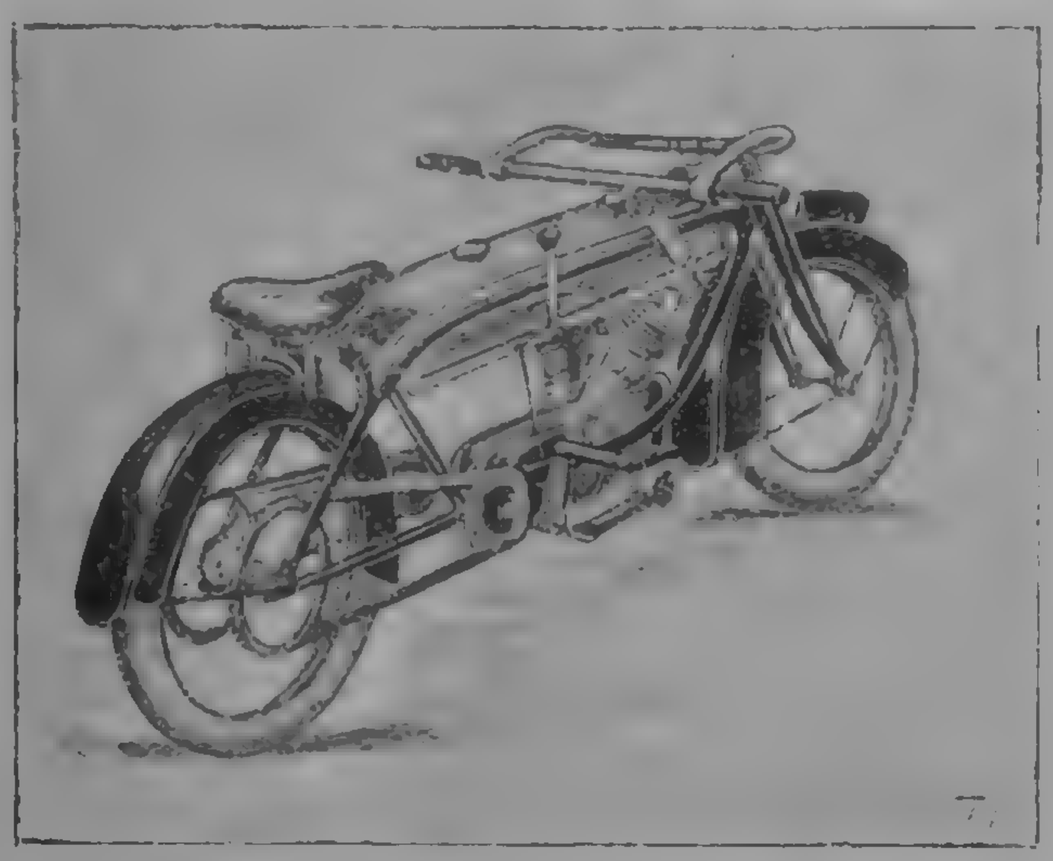
With the Engine Set Across the Frame.

I send you herewith a sketch of an idea for a motorcycle frame especially suitable for coupling to a sidecar. If you think it of sufficient interest you may reproduce it.

I am a subscriber to your paper through Smith's Library, Rue de Rivoli, Paris, and I may say I am a keen sidecarist.

G. GARNIER.

58, Rue de Glaciere,
Paris XIII.



Mr. G. Garnier's frame design. There would appear to be some difficulty in accommodating the flywheel.

Methods of Gudgeon Pin Fixing.

In reply to "Observer's" wonderful suggestion of the 23rd ult. regarding gudgeon pin locking, I wonder if he has ever seen the method the Rudge people employ in securing same. Their method is exactly as he suggests, which is simple but most effective.

Trusting you will find room for this in a corner of your most interesting paper. W. E. GRIME.

Hulme, Manchester.

An Ancient Lightweight Passenger Outfit.

The other day I came across an advertisement in a 1903 "Strand Magazine" the details of which I thought might be of interest to some of your readers. The passenger outfit of that day consisted of a bicycle fitted with a 1½ h.p. engine and trailer. The nearest approach to the above in present-day machines is the 1 h.p. J.E.S., which is 15 guineas cheaper in price.

I wonder if this was the limit in lightweight passenger outfits? I have always been an enthusiast of the sidecarette, but am waiting till three-speeds, clutch and kick-start are fitted.

Perhaps when the war is over some maker will provide us with a 2¾ h.p. two-stroke with three-speed incorporated with the engine, and with a light coach-built sidecar. Such a machine, if standardized, could be sold for £35 to £40, and would provide motor cycling for the million.

I wish your paper every success. LIGHTWEIGHT.

B.E.F., France.

A24

British Prejudice.

"Abacus" is rather unfortunate in possessing ignorant and prejudiced friends—one of whom "curls his nose," and I trust that his letter will not be regarded as being indicative of the average British motorcyclist. So far as my own experience goes, we, in these islands, are ready to appreciate and benefit by anything in the nature of improvements that hails from across the "herring pond." Witness the number of American machines which were bought in large numbers before the war and are considered still to be the motorcycles par excellence by the "prejudiced" British that "Abacus" refers to. I am unable to imitate the physical contortion of "Abacus's" friend by curling my nose, but I do curl my lip when I read such unmitigated nonsense about British prejudice.

Manchester. SYDNEY HALL.

Join the Motor Volunteers.

I have noticed a number of appeals from various parts of the country to motorists that they should join their local volunteer unit, having in view the grave situation upon the Western Front, and the possibility of invasion, when emergency transport would be indispensable. As a Motor Volunteer of some months service, and a man liable under the new Man Power Bill to be called up shortly, may I suggest that, apart from patriotic reasons, the motorist of 40-45 could not do better from his own point of view than join his local Volunteer Corps? It is well known that even men in the prime of their youth acknowledge the strain of the first weeks of military training, and the middle-aged civilian, accustomed to comfortable living, self-discipline and sedentary habits, may expect to have a very thin time when he first enters the Army. Training in the National Motor Volunteers is a very mild form of Army training, and is just what the type of civilian referred to needs to fit him for undergoing the real thing without undue discomfort. Imagine, furthermore, the saving in the nation's time and money, if the future "call-ups" were all smart, disciplined, fit men, such as the N.M.V. like to turn out, instead of flabby and unhappy business men of very little use so far as military needs are concerned. In my opinion, the man who can and does not join the Motor Volunteers now is not only a slacker but a very considerable fool.

Bolton, Lancashire. COMMERCIALUS.

"What Shall I Join?"

I have read with interest the article which appears in your issue of 30th April under this title. It gives just the information required by the "man in the street" whose time for joining up is approaching and who is wondering with mixed feelings what is in store for him.

At the same time I am surprised to see the simplicity of the A.S.C., M.T., tests for proficiency as set out in this article. I had always understood that these were so strict as almost to take the form of an inquisition, and I have met quite a number of apparently skilled men who have failed to get through. It would be interesting to hear if other of your readers who have experienced these tests had an equally easy time. EX-SOLDIER.

Neath.

[We understand that a theory test by a duly qualified officer has been introduced of late.—ED.]

Correspondence (contd.).

Ford or Sidecar?

With reference to "Boadicea's" article in MOTOR CYCLING of the 30th April, suggesting that the Ford will "overrun the ladies' market après la guerre and will compete with both the light car and motorcycle," is in my opinion very wide of the mark. It may be that the Ford car, if its importation is freely permitted after the war, will have a very wide sale. It is conceivable that it will compete with the light car. That it will compete with the motorcycle and sidecar at least to any appreciable extent is demonstrably absurd. Consult a hundred sidecarists on such a matter. You will find them very conservative. You will find in about 50 different ways the Ford car fails to appeal to them. Mostly the reasons given are very trivial, but there is one of substantial importance, namely, the question of running costs. There is no doubt that the Ford car would cost at least double and perhaps treble the annual expense of running a sidecar combination, not forgetting the question of depreciation. A cyclecar built on motorcycle lines might be a more attractive proposition.

E. S. LUCAS.

Streatham.

Motorcycles Cleaned, But Not Cars. "Boadicea" Raises a Query.

I should like to comment upon "Tay's" reference, in MOTOR CYCLING for 23rd April, to the fact that mechanics are set to clean the machines of lady motorcyclists attached to the Army. I find it difficult to reconcile the two following facts: Some months ago I interviewed the lady driver of a P and M. attached to the M.T., A.S.C., at Regent's Park, and I gathered from her that all cleaning, overhauling and repairing of the machines used by her and her contemporaries was done by male mechanics, although the drivers had, of course, to be prepared to do road repairs to their machines. On the other hand, visiting at the Grove Park A.S.C. camp recently, I was assured by the commandant of the Women's Legionists there—car drivers in this case—that all the cars and ambulances were cleaned by the women who drove them. Why is it that this very much heavier and more arduous task of cleaning big cars can be done by the Legionists if their contemporaries who drive motorcycles have their cleaning done for them? Possibly the explanation is that the A.S.C. drivers in Regent's Park, I was told, abided by certain working hours, after which they left the depot, whereas the workers at Grove Park are liable to service at all hours of the day and night.

BOADICEA.

OUR COMPETITIONS.

Plugs for Puzzling Problems.

WHEN the little problem which was set in last issue was devised it was anticipated that its simplicity would bring a host of correct solutions. Attempts by the hundred have come to hand from all parts of the country, but, curiously enough, an examination reveals that the proportion correctly deducing the cause of the trouble is very small.

It is quite obvious that a large number of the entrants either did not correctly read the details of the problem or else thought that they were purposely misleading; a course which, it is unnecessary to state, would have been very unfair. Despite the fact that it was clearly stated that the compression was good, quite a large number of attempts gives the trouble as being that the piston-ring slots were in line or the inlet valve was stuck in the "open" position.

Other competitors treated the subject humorously; for example the reader who suggested that the trouble was caused by the front number-plate being dusty!

The first correct solution opened on Thursday morning which complied with the conditions as set out was sent by Mr. D. F. Covey, of 9, Meadrow, Godalming, Surrey, who says:—

> Lack of power would evidently be due to some obstruction in the exhaust pipe, causing a cushioning effect at the top of the exhaust stroke, due to the compression of the spent gases, which would not escape quickly enough.
>
> The obstruction may be formed by:—
>
> (1) Excessive sooting of the exhaust pipe near the silencer, or
>
> (2) Mud and small stones in the open end of the exhaust pipe.
>
> The latter is the most probable.

A MOTOR CYCLING Sparking Plug has been duly despatched to Mr. Covey.

The problem this week is set in a somewhat different manner, but should prove equally entertaining. It is as follows:—

"A" set out on a business trip, intending to cover about 20 miles. The machine had never given any trouble and "A" was much surprised when the engine developed symptoms of "something wrong." A noticeable loss of power was followed by a vicious backfire; one or two intermittent explosions ensued, then the engine petered out. "A" at once looked for the cause of the trouble. The plugs were removed, laid on the cylinders, and found to give an excellent spark; the valves were examined, and the jet was cleaned, in fact, "A" did almost everything possible, but without avail. Fortunately he was near a village, so he pushed the machine and finally drew up before the local garage. "B," the proprietor, was summoned, and "A" explained his difficulty. "B" made a careful examination and a small adjustment; then he said: "Give me a spanner." "A" handed him a small adjustable spanner, "B" engaged a nut, gave half a turn, and remarked: "Try her now." "A" did, and, much to his surprise, the engine started and ran as sweetly as ever. QUESTION:—What adjustment did the garage proprietor make?

The conditions remain the same, i.e., one of the famous MOTOR CYCLING Sparking Plugs will be awarded to the competitor whose solution is first opened on the Thursday morning following date of publication, and is not only correct, but gives in not more than 250 words the reason for his deductions. Attempts should be marked "Plug" on the top left-hand corner of the envelope and should be addressed to the Editor, MOTOR CYCLING, 7-15, Rosebery Avenue, E.C. 1.

"Win the War" Competition.

IN addition to the ordinary contributors' rates, we are offering three bonuses of £2 10s., £1 10s. and £1 respectively for articles selected as being the best of those submitted and appearing in MOTOR CYCLING up to and including the issue of 11th June. These articles should preferably be of topical interest and suitable for illustration. An idea of the type of matter most likely to prove acceptable can be gained through a perusal of those articles published in the previous competitions. Contributions must be clearly marked "Win the War Article" on the top of the first page of MS., and should be addressed to the Editor, MOTOR CYCLING, 7-15, Rosebery Avenue, London, E.C. 1.

The prizes for the competition which has just closed are awarded as follows:—

First Prize (£2 10s.) to "W.E.H." for the article entitled "A Sidecar from the Scrapheap," which appeared in the issue dated 12th March.

Second Prize (£1 10s.) to "E.G.W." for the contribution entitled "An Easily Constructed Two-speed Gear," which appeared in the issue of 30th April.

Third Prize (£1) to "J.N.M." for the article entitled "An All-purpose Engine," which appeared in the issue dated 26th March.

Remittances for these amounts have been duly forwarded.

"Motor Cycling" 10s. Note Competition.

MOTOR CYCLING 10s. notes, franking the purchase of goods to this amount from any accessory dealer advertising in our columns, will be awarded to the senders of all accepted articles taking as a subject "Motorcycle or Cyclecar: Which will be the Most Popular when Peace Comes?" Contributors should give the reasons for their deductions. The closing date will be 27th May.

INFORMATION & ADVICE

LEGAL.
TECHNICAL.

COAL-GAS.
PURCHASE.

RULES:—Questions on technical matters, advice in selection of a new machine, etc., will be answered in the next issue after receipt of the inquiry so far as possible. Letters or postcards must be marked "I. and A." on the top left-hand corner. Questions must be numbered, and a copy kept for reference. Machines upon which an opinion is sought should be numbered. Replies can also be sent by post if a stamped addressed envelope for that purpose is enclosed. Routes and legal queries must be kept separate from others.

R.F. (Halifax).—The address you require is the Rex Motor Manufacturing Co., Earlsdon, Coventry.

Ajax (Coalville).—If you fill the tubing with sand, packed fairly tight, and block the end, you will find that you will be able to bend it successfully without kinking.

L.B. (Moseley).—Yes; providing they are on leave from one of the fighting zones and have made application for a permit to the Petrol Control Department.

H.A.W. (London, S.W.).—While we think that the device which you have designed is extremely ingenious, we fear that the selling price would be against it. We do not know of any previous similar patent.

S.G. (care of G.P.O.).—The T.D.C. motorcycle is made by Mr. T. D. Cross, Vesey Street, St. Mary's, Birmingham. It is a very reliable and satisfactory machine, and one that can be thoroughly recommended.

J.R. (Brighton).—There is no doubt that you must have a short circuit somewhere, not necessarily in the points, though without seeing the machine it is impossible to give you any clue as to where to look for it.

G.F. (London, S.E.).—Your query is most unusual, but we are inclined to agree with the explanation which you offer, i.e., that the two thicker-headed valves are intended for the exhaust and the two thin for the inlet.

A.E. (London, S.W.).—We do not know of any book dealing with this subject that is published. As a matter of fact, as you will probably have gleaned from the article in question, the idea is not yet sufficiently developed to take practical form.

C.D.S. (Ripon).—(1) We fear that you do not stand much chance of obtaining the necessary permit, but you had better place the facts before the Petrol Control Department, 19, Berkeley Street, London, W.1. (2) No. (3) Not if you do not intend taking the machine out on the road.

Miss F.R.G. (London, N.W.).—While we thank you for your good offices, we regret that we have no trace now of the particular issues that our correspondent required, and, as we have not retained his address, it is impossible to get into touch with him.

H.E.T. (Middlesbrough).—It would be necessary for you to apply to the Petrol Control Department, 19, Berkeley Street, London, W., for the necessary permission, and your case would be very much strengthened if a statement from the family physician accompanied your request.

F.E.W. (Strawberry Hill).—Although we do not know of such a fitment, it is, of course, quite feasible, but why not go in for a two-speed gear of the N.S.U. type (now made by Messrs. Bradbury and Co.), and thus obtain the benefit of both free-engine clutch and two-speed gear?

P.C.S. (Thornton Heath).—(1) It appears as if the armature winding had swollen somewhat with damp. Try the effect of drying in a warm oven. (2) Undoubtedly the rubbing has resulted in a short circuit and we would advise you to have the armature rewound. (3) No; we have found that the carburetter, as fitted, gives far and away the best results. (4) Yes; by all means fit new springs. From your description, the existing ones are far too weak. (5) We have never tried the case that yo usuggest, but have always found that binding with insulating tape is effective. (6) If you set this to deliver from 15 to 20 drops per minute this should suffice.

L.P.H. (London, W.C.).—See the reply to "W.R.B." (Maida Vale).

T.B.P. (Bradford).—No; it will not be necessary, providing, of course, you do not exceed the amount of spirit you are granted for use.

L.-Cpl. H.V. (Tidworth).—No; you will not be liable for the Inland Revenue for your motorcycle, providing it has not been used at all during the period you mention. Permits are only granted to men on leave from a fighting zone, and, judging from your address, you will not be entitled to one.

Lion (Clapham).—(1) This point has not cropped up before, but you may be sure that if you lay your case before the Petrol Control Department you will receive every consideration. (2) It is pretty safe to prophesy that the cost of motor cycling will be a little higher after the war than it was in pre-war days.

T.C. (Wantage).—A number of Douglas hints appeared in our issue of the 12th March, including one for leading a hot-air pipe from the exhaust pipe to the carburetter. This would be an essential feature if you wished to use the spirit you mention, and you would be well advised to read up the article and fit the device.

C.W.M. (Ipswich).—Write to the Petrol Control Department, 19, Berkeley Street, London, W. 1, and lay all the facts before them. It is quite likely that you will get the necessary licence granted you, and, further, it is probable that they will grant you a permit for production to the police in the event of your being stopped.

C.S. (Edgware).—The flywheel on the machine you mention fits on a taper on the mainshaft, and there can be little doubt that this taper has worn unevenly, hence the impossibility now of lining up the flywheel. We regret we have not the necessary information in our possession to answer your second query, but application to the makers should bring it to you promptly.

C.M. (B.E.F.).—Comparisons are always odious. Both the machines you mention are really excellent, and there is little or nothing to choose between them, although it is probable that the last-named would be a little faster. Road speeds are never reliable, and we make a point of never accepting figures except when the times have been taken officially by recognized timekeepers. Naturally, these are not available in the cases you quote.

T.T.R. (Perth).—Any agent should be able to procure the parts you require from the manufacturers on production of the priority certificate, which we take it you hold. If the manufacturers cannot supply the parts, we can only suggest that you approach one of the concerns that make a speciality of producing motorcycle parts to customers' own specification. Probably the Laystall Motor Engineering Works, 34, Queen Street, London, E.C., could fit you out.

H.L. (Olney).—From the sketch you sent we are able to identify the part as the pinion wheel. The expansion screw which you wish to remove has an ordinary right-hand thread, but you will require a very strong screw-driver to remove it. After this has been done, the pinion can be levered off without touching the keyway. Before removing the pinion, however, take careful note of the position of the key, as it is very easy to insert it in the wrong way, with the effect that the timing will be incorrect. Regarding your second query, we do not know of this particular free engine, and cannot give you the information you require.

C.S.B. (Bristol).—The number appeared in our issue of 26th March and was 11,705.

M.H.P. (Hull).—The T.D.C. is made by T. D. Cross, Vesey Street, St. Mary's, Birmingham.

C. (London, E.).—The address you require is Messrs. S. Wolf and Co., 115 Southwark Street, London, S.E.

H.L. (Olney).—The Mabon clutch is made by the Mabon Motor Works, Bruce Grove, Tottenham. We advise you to get into touch with them direct.

M.S. (Withyham).—Although you state that you have no air leaks, this is undoubtedly the cause of your trouble. We advise you to go thoroughly over your induction pipes, valve caps, etc.

W.R.B. (Maida Vale).—You had better get into touch with Mr. J. A. Masters, of the Harley-Davidson Motor Co., Ltd., Harleyson House, Newman Street, W.C., who will give you the necessary information.

C.T., G.W.F., L.H.H. and very many others.—See the series of articles which commences with last issue entitled "What Shall I Join?" and in which you will find all your queries answered.

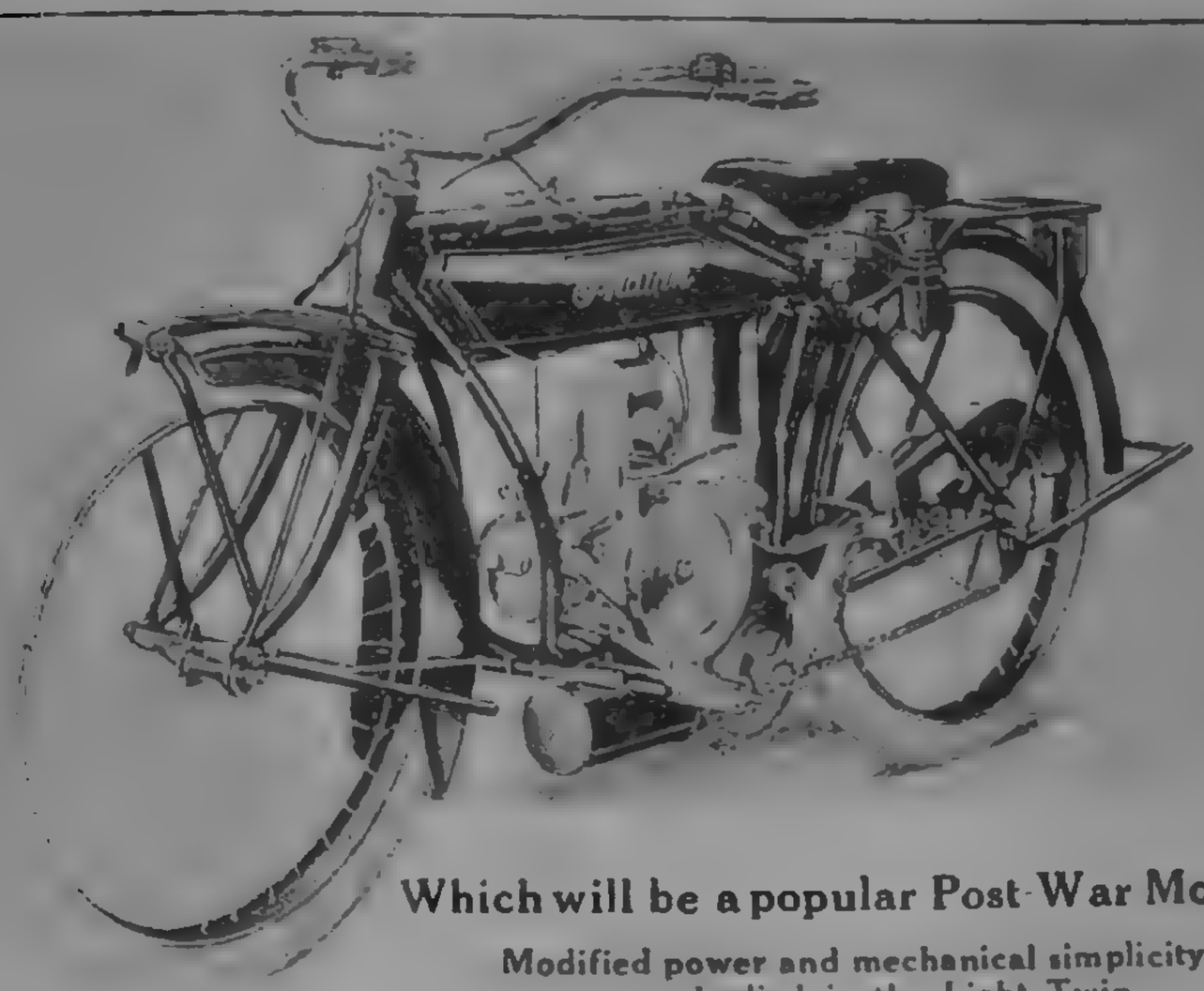
R.O.B. (Sheerness).—(1) It is impossible to give you a definite ruling on this point, but we think you will be justified in taking the risk. (2) Provided you are granted the necessary permit, and the journey is essentially for your business, you would be quite safe in taking a passenger.

H.T. (Congleton).—The Wolf motorcycle is made by the Wulfruna Engineering Co., Ltd., Wolverhampton. The King Dick engine, with which it is fitted, is a product of the Abingdon Ecco, Ltd., Tyseley, Birmingham, and is an excellent engine in every respect. Altogether, we consider that you have made a good bargain.

R.O.L. (Twickenham).—(1) We do not think that this gear would be quite equal to the load, and you would do better by replacing it with a Jardine. (2 and 3) This would be already fitted with the necessary chain sprockets. (4) We should say about 50 m.p.g., with a top speed of 40 m.p.h. (5) About 5½ to 1. (6) The same as a motorcycle. (7) If you desire to adhere to the present hub gear you would find the existing means of transmission quite satisfactory, although it would be better if you fitted some form of undershield to protect as much of the belt as possible. (8) We are not in a position to answer this question, and you had better approach the railway company direct. (9) We know nothing derogatory regarding this engine. In fact, it bears a very high reputation. (10) We hope to revive this event when the advent of peace permits.

WILL our readers reduce the needless trouble experienced in the working of this bureau by carefully obeying the rules, especially when a route query is made? "I. and A.," "Route," or "Legal" should be distinctly marked on the left-hand corner of the envelope or postcard. :: :: ::

1918 Indian LIGHT TWIN.



Which will be a popular Post-War Model.

Modified power and mechanical simplicity are embodied in the Light Twin.

We regret that we are not in a position to supply motorcycles at the present time. But we can send 1918 abridged descriptive list on application.

This applies to Great Britain only.

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HENDEE MANUFACTURING CO.,

"Indian House," 366-368, Euston Road, London, N.W. Telephone: Museum 1618. Telegrams: "Hendian, Euroad, London.

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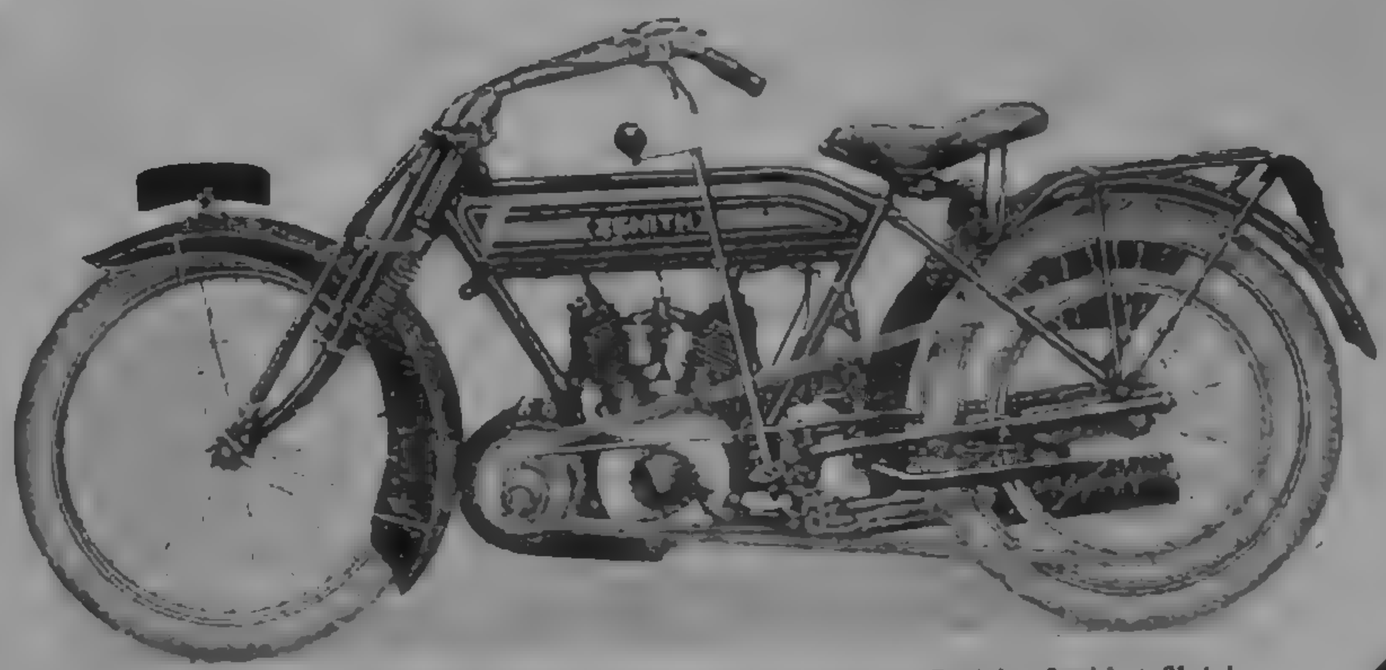

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MOTOR-BICYCLES.

—**A.J.S.**, 2¾hp, 1915, 2-speed, in very good condition, excellent machine, £38. George, 12 Northwick Rd., Evesham. 443-a247

—**A.J.S.**, 1917, 6hp, 3-speed, special war model, fitted with 700 by 80 tyres, £92. Exeter Motor Cycle and Light Car Co., Ld., Bath Rd., Exeter 443-23

—**A.J.S.**, 2¾hp, 3-speed, excellent condition, £28. W. P. Edwards, Taunton. 443-15

—**ALLONS**, immediate delivery 1918 models. W. P. Edwards, Taunton. 443-13

—**ARIEL**, 1914, 5-6 twin, 3-speed countershaft, Sensspray, coach-built sidecar, accumulator, electric lighting, tyres perfect, £52. Williams, 2 Beaconsfield Rd., New Southgate. 445-a271

—**B.S.A.**, 1916, 4½, model K, three-speed, P. and H. lamps, horn, tools and spares, hardly soiled, stored past two years, £55. Wade, 71 Moorland Rd., Portsmouth. 443-c297

—**B.S.A.**, 1913 model, and coach built sidecar, fine condition, fully equipped, £30, or near offer. H.M., 30 Delvino Rd., Parson's Green. 443-43

—**CALTHORPE**, 1916, 2-stroke, lamps and horn, £30. Parker and Son, St. Ives, Hunts. 443-34

—**CALTHORPE** combination, 4hp twin J.A.P. engine, Enfield 2-speed gear, perfect condition throughout, all-chain drive, £55, exchange. 136 Lavenham Rd., Southfields, S.W. 18. 443-a257

—**CALTHORPE JUNIOR**, 2 speeds, free engine, perfect running order, £10 10s., gift. Watchmaker, 119 Ley St., Ilford. 443-a242

—**CHATER LEA-J.A.P.**, 1914, Armstrong 3-speed, torpedo sidecar, lamps, perfect running order, nearly new tyres, £30. Uphill, White Horse, Blackmore, Essex. 443-a243

—**DOUGLAS**. Send your order to Gourley, the great Douglas Agent, Fallowfield, Manchester. 463-836

—**DOUGLAS** motorcycles. We can supply by return 1918 models on receipt of permit. Eli Clark, The Douglas Agent, 196 Cheltenham Rd., Bristol. zzz-277

—**DOUGLAS**, 1917, 4hp, models A and B; 2¾hp model W; also U and V, 1916 specification, absolutely new; immediate delivery against priority permit for doctors, farmers, war and munition workers. How and where to apply, full particulars, write, Douglas Specialists, Robinson's Garage, Green St., Cambridge. 443-22

—**DOUGLAS**, 1914, 2¾hp, 2-speed, T.T. bars, £35. Elce and Co., 15-16 Bishopsgate Ave., Camomile St., E.C. 3. 443-29

—**DOUGLAS**, 1915, 2¾, 2-speed clutch, low handles, Bosch, A.M.A.C., hot-air jacket, footboards, fine condition, large exhaust, lamps, £44. Heath, 3 Newman St., W. 443-a243

—**DOUGLAS**, 1918 model, prompt deliveries on permit. W. P. Edwards, Taunton. 443-12

—**DOUGLAS**, T.T., 2¾hp, 2 speeds, in nearly new condition throughout, low mileage, market value £34, but will accept first cash offer of £26 to effect immediate sale, owing to owner joining the Colours. 24 Grosvenor Ave., East Sheen, S.W. 14. 443-a265

—**ENFIELD** 6hp combination, as new, fully equipped, £60, or take cheaper machine and cash. 436 Whitehorse Rd., Thornton Heath. 443-a261

—**ENFIELD** 1913 combination, 6hp, lamps, horn, £45. Elce and Co., 15-16 Bishopsgate Ave., Camomile St., E.C. 3. 443-31

—**ENFIELD**, 3hp, 2-speed, twin, £57 10s.; ditto, special C.T. model, £57 10s.; delivery from stock. Exeter Motor Cycle and Light Car Co., Ld., Bath Rd., Exeter. 443-25

—**HARLEY** combination, bought new in 1916, khaki colour, £68, very nice condition indeed, exchange considered. 40 Clonmore St., Southfields, S.W. 18. 443-a254

—**HUMBER**, 3½hp, latest 1918 model, in stock for immediate delivery. Baines, Garage, Oakham. 443-a40

—**HUMBER**, 1911, 3½hp, and sidecar, 2-speed, perfect running order, £20. Uphill, White Horse, Blackmore, Essex. 443-a248

—**INDIAN**, 1911, 7-9hp, 2 speeds, clutch, kick-start, spring wheel sidecar, good condition, runs 50 m.p.g. on substitute, £10. 215 Kingston Rd., Wimbledon, S.W. 19. 443-a270

—**INDIAN**, Powerplus, latest model, 3-speed, with Swan coach-built sidecar, spotless condition, £69. Write first, 36 Heber Rd., Cricklewood. 443-a269

—**JAMES**, 1915, No. 6 combination, like new, fully equipped, all lamps, horn, speedometer and spares, ready to drive away, £65, present cost well over £100. 47 Auckland Rd., Ilford, Essex. 443-a251

—**J.A.P.**, 1914, 6-8hp combination, lamps and horn, 3 speeds, kick-starter, good condition, £38 or offers. Parker and Son, St. Ives, Hunts. 443-36

—**KERRY-ABINGDON**, 3½, excellent condition, new tyres, £20. Malpass, Cranbrook, Kent. 443-a258

—**KERRY-ABINGDON**, 3½hp, free engine, 2-speed gear, B. and H. carburetter, Brooks, Continental front, new Dunlop extra heavy, lamps, tube and belt enso, perfect order, £28. 102 Lothian Rd., Brixton. 443-a256

—**LEVIS**, 2½hp, 1915, fully equipped, 17 guineas. W. P. Edwards, Taunton. 443-16

—**MATCHLESS**, latest war model combination, complete with detachable wheels, spare wheel and tyre, £120. Exeter Motor Cycle and Light Car Co., Ld., Bath Rd., Exeter. 443-27

—**MINERVA**, 2hp, exhaust cam, would buy engine cheap. Pike, Barton, Beds. 443-a244

—**NEW IMPERIAL-J.A.P.**, 8hp, 3-speed, war model combination, 109 guineas; delivery from stock. Exeter Motor Cycle and Light Car Co., Ld., Bath Rd., Exeter. 443-24

—**NORTON**, "Big 4," all-chain drive, military model, £82. Exeter Motor Cycle and Light Car Co., Ld., Bath Rd., Exeter. 443-26

—**NORTON** "Big 4," all-chain drive, immediate delivery. W. P. Edwards, Taunton. 443-14

—**N.U.T.**, 3½hp twin, 3-speed, T.T. bars, disc wheels, fully equipped and in splendid condition. Letters only, 55 Avondale Ave., Woodside Park, Finchley, N. 12. 443-a266

—**O.K.**, 2¼hp, 4-stroke, 1914, used 1 year only, practically new condition, good tyres, good lamps, 40 m.p.h., 140 m.p.g., £18, no offers. 11 Tulse Hill, S.W. 2. 443-a211

—**P.M.**, 3½, 2-speed, all-chain, A.M.A.C., 26-2[illegible] wheels, sound tyres, perfect condition throughout, twin frame and tank, headlamp and generator, £7 the lot. Cycles, 11 Stanley Parade, Ealing Rd., Wembley. 443-a276

—**REX**, 3½, Bosch, free engine, mechanically sound, Dunlops, make fine solo machine, £13. 52 High St., Homerton, N.E. 9. 443-a277

—**REX** de luxe, twin, 1913-14 combination, 2-speed, lamps, speedometer, all accessories, very little used, tyres nearly new, £36. Graves, Fairmead, Bowes Rd., New Southgate. 445-a272

—**ROVER**, 1914, 3½hp, 3-speed, lamps, horn, £38. Parker and Son, St. Ives, Hunts. 443-35

—**RUDGE**, 3½hp, 2-speeds, tyres, etc., excellent, £25, nice appearance. W. P. Edwards, Taunton. 443-17

—**RUDGE**, 3½hp, clutch model, 1913, new tyres, good appearance, £18 for quick sale, good 2-stroke considered part exchange. 19 Clonmore St., Southfields, S.W. 18. 443-a255

—**RUDGE-MULTI**, 1914, with new coach-built sidecar, 3½hp, magneto, Multi gear, f.e., lamps, beauty, 35 guineas; easy terms. Below.

—**RUDGE-MULTI**, 1917, new, 3½hp, magneto, Multi gear, lamps, horn, Dunlops, cost £73 10s., great bargain, 48 guineas, exchanges, also easy terms. Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). 'Phone, Battersea 327. 443-c144

—**RUDGE-MULTI**, I.O.M., latest model, run 2500 miles only, many accessories, £49. Write first, 36 Heber Rd., Cricklewood. 443-a268

—**TRIUMPH** 1913 combination, 3-speed, Dunlops, almost new, Miller and Duco lamps and generators, Phœnix 12-guinea coach-built sidecar, must sell, joining up, best offer. 10 Shepherd's Bush Green, W. 443-a274

—**TRIUMPH**, 1912, 3½hp, clutch model, overhauled, £20. Elce and Co., 15-16 Bishopsgate Ave., Camomile St., E.C. 3. 443-30

—**TRIUMPH** motorcycle and coach built sidecar, 1913-14, 3 speeds, clutch, Sturmey-Archer gears, splendid turnout, fully equipped, bargain, £53; seen near London. Box No. 3341, c.o. "Motor Cycling." 443-a239

—**TRIUMPH**, 3½-4, magneto, good tyres, ready drive away, only £12 15s. Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). 443-c145

—**VELOCE**, 2¼hp, 2-stroke, A.M.A.C., Druids, Bosch, £10 10s. 31 Stowaway Rd., Southend-on-Sea. 443-a259

—**ZENITH**, 4-5hp, countershaft, twin clutch and kick-starter, fully equipped, in splendid condition, enamelling and plating as new. Write first, Avondale Ave., Woodside Park, Finchley, N. 12. 443-a267

—**ZENITH-GRADUA**, 1914, 6hp, and Gloria spring-wheel sidecar, fast and in good condition, £35, all accessories. Ealing, 286 Walton Rd., Molesey, Surrey. 443-a264

MISCELLANEOUS MOTOR-CYCLES (unclassified).

—**JAMES**, 1915, 2¼hp, 2-stroke, 2 speeds, excellent condition, £32. See below.

—**JAMES**, 1916, 2¼hp, 2-stroke, 2 speeds, lamps, and horn, £36. See below.

—**JAMES**, 1917, 2¼hp, 2-stroke, 2 speeds, lamps, and horn, £40. See below.

—**JAMES**, 1915, 4¼hp combination, 3 speeds, clutch and kick starter, all-chain drive, £60. See below.

—**ROYAL ENFIELD**, 1916, 2¼hp, 2-stroke, 2 speeds, lamps, and horns, £38. See below.

—**ROYAL ENFIELD** combination, 1916, 6hp, lamps, horn and speedometer, £78. See below.

—**DOUGLAS**, 1910, 2¾hp, lamps and horn, £15. See below.

—**DOUGLAS**, 1913, 2¾hp, model V, headlight, rear lamp and horn, £28. See below.

—**DOUGLAS** combination, 1915, 4hp, Lucas lamps and horn, Stewart speedometer and warning signal, £63. See below.

—**WOLF-J.A.P.**, 1915, 2½hp, countershaft 2-speed gear, £20. See below.

—**ALLON**, 1915, 2¾hp, 2-stroke, excellent condition, £25. See below.

—**ALLON**, 1916, 2¾hp, 2-stroke, excellent condition, £30. See below.

—**ALLON**, 1917, 2¾hp, 2-stroke, 2 speeds, £40. See below.

—**CALTHORPE**, 1915, 2¼hp, 2-stroke, 2 speeds, lamps and horn, £27. See below.

—**RUDGE**, 1916, 3½hp, Multi gear and clutch, lamps and horn, £42. See below.

—**TRIUMPH**, 1910, 3½hp, T.T. model, speedometer, £20. See below.

—**PREMIER**, 1913, 3½hp, countershaft gear and clutch, fitted with coach-built sidecar, £38. See below.

—**PREMIER**, 1913, 3½hp, and tradesman's side-carrier, 3 speeds, clutch and starter, £50. See below.

—**PRECISION**, 1915, 4hp twin, 2-speed countershaft gear, £35. See below.

—**NEW IMPERIAL-J.A.P.**, 1915, 2¾hp, 2-speed model, £27. See below.

—**CLYNO** combination, 1914, 6hp, hood, screen, detachable wheels and spare wheel, complete, lamps, horn and speedometer, £62. See below.

—**A.J.S.**, 1912, 6hp, 2-speed countershaft gear, clutch, and kick starter, and Gloria coach-built sidecar, £35. See below.

—**LEVIS**, 1915, 2¼hp, 2-stroke, lamps and horn, new tyres, £20. See below.

—**INDIAN**, 1914, 7hp combination, spring frame, dynamo lighting, electric starter, horn, speedometer, etc., £60. See below.

—**ALDER**, 1916, 2½hp, V.T.S., 2-stroke, 2 speeds, £20. See below.

—**ALL** the above motorcycles are ready for immediate delivery and deferred payments can be arranged for any of them. Write for further particulars and list C. 33, to the Eastern Garage Co., 418 Romford Rd., Forest Gate, E. 7. Telephone No., East Ham 490. T.A., "Egaraco, London." 443-42

—1916 **INDIAN** Powerplus electric combination, £90.

—1916 **INDIAN** Powerplus electric combination, £87 10s.

—1916 6hp **ENFIELD** combination, in good order, £73 10s.

—1915 **INDIAN**, 3-speed, solo, £55.

—1915 **HARLEY-DAVIDSON** combination, £60.

—1915 **BABY LEVIS**, disc wheels, like new, £21.

—1914 **INDIAN** 2-speed combination, £50.

—1915 4hp **B.S.A.** combination, £50.

—1913 3½ **RUDGE-MULTI**, £22.

—1913 2¾ **DOUGLAS**, 2-speed, £33.

—1914 6hp **SUNBEAM** combination, £65, A1 condition.

—1914 3½hp **NEW HUDSON** 3-speed combination, £37 10s.

—1913 3½hp **NEW HUDSON**, 3-speed, and sidecar, £32.

—1913 **ROVER**, 3-speed, solo, £33.

—1913 **ANNO**, 3½hp, 3-speed, and sidecar, £24.

—1913 6hp **REX** and coach-built sidecar, £45.

(For address see column 3.)

—1912 6hp **REX**, solo, 2-speed, £20.

—3½ **BROWN**, 2-speed N.S.U., £19 10s.

—1912 2¾ **DOUGLAS**, 2-speed, in splendid order, newly enamelled, £25.

—**TO** officers and soldiers on leave. Please note that we do not let on hire motorcycles, but we are prepared to sell you a machine and re-purchase same at a given fixed price when your leave is up, providing that the machine is in good running order.

—**ALL** the above machines are guaranteed in the best of order and sent on approval-deposit. Remember that when you buy a machine from us we have all spare parts in stock, should at any time you require them. Jones's Garage, Broadway, Muswell Hill, London, N. 10. 'Phone, Hornsey 2562. 443-16

—3½hp **COACH-BUILT** combination, except for small damage to back of sidecar, with petrol tin, as good as new, 1917 model, tyres in perfect order, full treads, hardly worn, many spares, including contact breaker (never used), valve, Lucas acetylene lamps, Klaxon and horn, belt and fasteners, guaranteed in perfect order and going well, sold on account of buying Morgan with more room and less clothes, price £75. Hodgson, Nocton, Lincoln. 443-c266

—**SEVERAL** late model lightweights and combinations in stock, fully equipped at reasonable prices. Write us your requirements. Mebes and Mebes, 154-6 Gt. Portland St., W. 1. Tel., 3426 Mayfair. 443-23

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—**"PRACTICAL FLYING."** Complete course of flying instruction, by Flight Commander W. G. McMinnies, R.N., with an introduction by Major-General W. S. Brancker, R.A.F., and a chapter on the medical aspects of aviation by H. Graem Anderson, M.B., Ch.B., F.R.C.S.; 237 pp. cr.n. 8vo. Over 100 illustrations, maps, diagrams, etc. 3s. 9d. net; post free 4s. Temple Press Ltd., 7-15 Rosebery Ave., London, E.C. 1. zzz-33

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—**RILEY** cyclecar, 3-wheeler, 9hp, w.-c., 4-speed gearbox (reverse), front wheel foot brake, rear hand, worm steering, chain drive, silent, reliable, economical, £60. 21 Cranhurst Rd., Willesden Green, N.W. 443-a198

—8hp s.c. **HUMBER** car, windscreen, Bosch, tyres and condition good, wants slight overhaul, nearest £11, must clear. Uphill, White Horse, Norton Heath, Blackmore, Essex. 443-a250

—**SWIFT** 2-seater, 7-9 twin, magneto, 3 speeds, reverse, detachable rims, hood, screen, lamps, horn, wants tuning, can be driven away, gift, 29 guineas. Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). 443-c116

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COAL-GAS CONVERSIONS.

—**FABRIC** for making your own balloon-type gas container. Messrs. Green Taxis, Stores Dept., 27a Upper Marylebone St., Gt. Portland St., London, W. 1. 443-20

—**COMPRESSED** coal-gas fittings for motor vehicles. Messrs. Green Taxis, Stores Depot, 27a Upper Marylebone St., Gt. Portland St., London, W. 1. 443-19

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—**IF** you are wanting to do an exchange, send for our list of new and second-hand motorcycles. The North Wales Motor Exchange, Holt St., Wrexham. zzz-298

—**EXCHANGE** 3½ clutch model Singer and cash for Douglas or good 2-stroke, or sell, £20. 85 Revelstoke Rd., Wimbledon Park. 443-a252

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—**DREADNOUGHT** motorcycle policies at Lloyd's. Low premiums by monthly payments. Before insuring elsewhere write for prospectus issued solely by Roys, Ld., 199 Piccadilly, London. Telephones, Regent 5878-9. zzz-892

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—**REPAIRS** and spare parts. The Runbaken Magneto Co., Ld., Camp St. Works, Manchester. Telephone, 8266 City (3 lines). Telegrams, "Runmag, Manchester." zzz-847

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——**E.I.C.** magnetos, new, £5. City Motor Co., 125 London Rd., Manchester. 451-995

——**MAGNETO** repairs of every description. We are late from the Bosch works, and are entirely British, and give same guarantee at lowest possible prices. We have a large stock of single, 2-cylinder and V-type magnetos, suitable for all purposes, guaranteed and sent on approval against cash. Magnetos bought or taken in part payment. The Magneto Repairing and Winding Co., 158 Seymour St., London, N.W. 1. Telephone, Museum 1158. Telegrams, "Kumagnelec, Norwest, London" 451-b215

——**REPAIRS** by manufacturers. Kenyon and Torrance, 399 Gt. Western St., Rusholme, Manchester, can now undertake magneto repairs accompanied by Class A or B certificate. Same can receive immediate attention, and be returned without delay. 406-969

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——**"MOTOR CYCLING MANUAL."** The handbook that every motorcyclist—novice and expert—has been waiting for. Post free 1s. 3d. on paper, from "Motor Cycling" Offices, 7-15 Rosebery Ave., London, E.C. zzz-127

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——**PULLEYS** for any motor, fixed 7s. 6d., adjustable 14s., plated, guaranteed carriage paid. Perkins and Son, 435 High Rd., Leyton. 'Phone, 248 Walthamstow. 455-n263

——**SIDECAR** screen, perfect, to fit Bradbury sidecar, £1; large adjustable pulley, fits Rex, 7s. 6d.; Veeder cyclometer for motorcycle, 5s.; 26 by 2¼ Continental cover, b.e., new, 12s. 6d.; speedometer for 26-in. wheel, complete, 30s.; ½ doz. motorcycle plugs, good, 9d. each; Motosacoche motorcycle, magneto ignition. Druid spring forks, quite sound, complete, £7. W. Jones, 61 Rhosddu Rd., Wrexham. 443-44

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—**ADVICE** and handbook free. King's Patent Agency, Ld., 165 Queen Victoria St., London. zzz-660

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——**C. R. FOSTER,** of Leeds, regrets being unable to undertake any more repairs until further notice, owing to all available plant being engaged on war work. zzz-497

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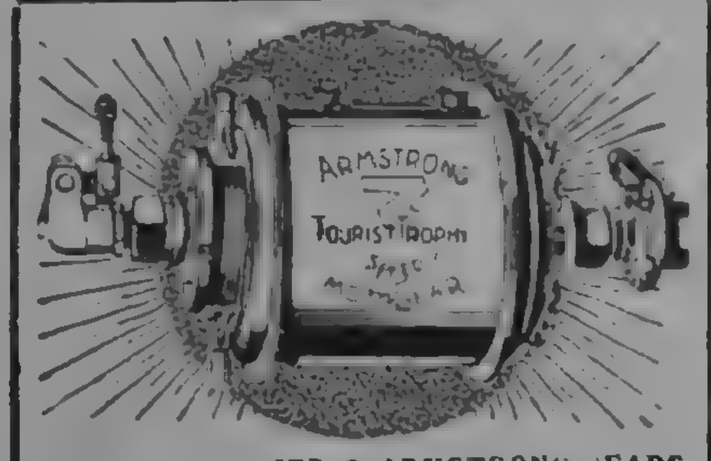

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Under the above regulation, advertisements offering situations with firms whose works are situated within 30 miles of London and whose business consists wholly or mainly in engineering, shipbuilding, or the production of munitions of war, or of substances required for the production thereof, must contain the words — "NO PERSON ENGAGED ON GOVERNMENT WORK OR RESIDENT MORE THAN 10 MILES DISTANT NEED APPLY."

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ALLDAYS ALLON from	37 10
ROYAL RUBY, 2-stroke, £32; J.A.P. 2-speed	46 0

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ENFIELD (2), 1916, 6 h.p., combination, Lucas dynamo set, hood, screen	£110 and £105 respectively
ENFIELD, 1914, 6 h.p., comb., with accessories	£68 10
ENFIELD, 1916-17, 6 h.p., hood, spdr., 3 Lucas lamps, horn, screen	115 0
ENFIELD, 1916, 6 h.p., combination, all access., condition A1	78 10
HARLEY-DAVIDSON (2), 1915, mag. model, with sidecar	£72 10 and 68 10
SINGER, 1913, 4¼ h.p., 2-sp., countershaft, spdr., lamps, horn, solo	29 10
ARIEL, 1915-16, 3½ h.p., countershaft, kick-starter, spdr., lamps, horn	72 10
CALTHORPE-J.A.P., 1916, 2-sp., and accessories	29 10
A.J.S., 1915, 4 h.p., combination, hood, screen	74 10
TRIUMPH, 1913, 3-sp.	27 10
TORPEDO PRECISION, 2½ h.p., hand clutch	12 10
JAMES, 1916, No. 6 combination, silencer, spdr., lamps, horn, apron	73 0
JAMES, 4¼ h.p., 1913, solo, with accessories	22 10
LEVIS, Popular, 1916, sound, with accessories	25 10

Second-hand Machines—Continued.

INDIAN, 7-9 h.p., 1915, clutch model, lamp, horn	£49 10
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NEW HUDSON, combination, 3¼ h.p., 3-sp.	31 0
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DOUGLAS, 1914 late, 2-speed, clutch, kick-starter	39 10
DOUGLAS, 1911	13 10
LUGTON, 1913-14, 4 h.p., with 2-sp. B.S.A. gear	29 10
ALLON, 1917, 2-sp., H. clutch model, accessories, as new	41 0
AUTO-WHEELS, Standard model	7 10
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WATSONIAN, new, 2 models "G"	£10 18 6
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CALTHORPE Co.'s gent's roadster, 2 or 3-sp., Dunlop tyres, gear cases, 22, 24 or 26 in.	£15 15 0
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ARIEL, lady's Standard, 20, 22, 24 in.	11 0 0
ARIEL, gent's Standard, 22, 24, 26 in.	10 10 0
NEW HUDSON, gent's Royal Roadster, 21, 23, 25 in.	13 13 0
NEW HUDSON, gent's Standard	11 11 0
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FARADAY, gent's roadster, 22, 24, 26 in.	9 10 0
Juvenile Cycles, boy's and girl's, ex Raleigh, ea.	8 19 6
B.S.A., gent's roadsters	£14 10 0, 11 10 0
B.S.A., lady's roadster, 22, 24 in.	11 15 0
RALEIGH, model "E" racer	11 11 0

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ROVER, 24 in. lady's roadster	6 5 0
SWIFT, 24 in. Special roadster	7 17 6
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—**ENFIELD,** 6 and 8hp, including cylinders and pistons.

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—**THE** Editor of "The Commercial Motor" will be pleased to be advised of any stocks of old type or obsolete commercial-vehicle spare parts, as well as of spares for those touring-car models which are commonly used for conversion to delivery vans, etc. Particulars should state types and principal parts available, and these will be included in the Spare Parts Bureau list published regularly in the editorial columns of "The Commercial Motor." Letters should be marked "Spare Part," and addressed to The Editor, "Commercial Motor," 7, Rosebery Ave., E.C. zzz-73

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—**TANKS.** Tanks. Tanks made to order, repaired or enamelled; all-metal sidecar bodies; general sheet-metal work, lists free. Attwood's, 8a Rosebery Ave., E.C. Tel., Central 12415. 460-741

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Lately several advertisements have been received too late for inclusion, although despatched on Tuesdays.

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